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THE RUBBER AGE

ESTABLISHED 1917

One of the World's Outstanding Rubber Journals

OCTOBER
1939

VOLUME 46
NUMBER 1

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Published on the 15th of each month by

PALMERTON PUBLISHING COMPANY, INC.

Printing office,
East Stroudsburg, Pa.

Editorial and Advertising Offices,
250 West 57th St., New York City

Entered as Second Class Matter, October 20, 1933 at the Post Office at East Stroudsburg, Pa., under Act of March 3, 1879. Subscription Rates: Domestic, $2.00 a year; Canada, $2.50; Foreign, $3.00. Single copies up to 3 months old, 25 cents; over 3 months old, 50 cents. Telephone COlumbus 5-2923, 5-2924. Contents Copyrighted 1939 by the Palmerton Publishing Company, Inc. Indexed in Industrial Arts Index. OFFICERS: P. L. Palmerton, President; E. D. Osborn, Vice-President and Secretary; Peter P. Pinto, Treasurer.

An Index to Vol. 45 of THE RUBBER AGE will be found facing page 66 of this issue.

Also Publishers of:

RUBBER RED BOOK
Directory of the Rubber Industry
Published Bi-Annually

ANNUAL BIBLIOGRAPHIES OF RUBBER LITERATURE
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Text Book on Latex

LATEX AND ITS INDUSTRIAL APPLICATIONS (Vol. I)
By Frederick Marchionna
Bibliography of latex patents and literature to June, 1932.

LATEX AND RUBBER DERIVATIVES AND THEIR INDUSTRIAL APPLICATIONS (Vols. II & III)
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The Rubber Age

Published Monthly at East Stroudsburg, Pa.
Editorial and Advertising Offices: 250 W. 57th St., New York

Vol. 46 October, 1939 No. 1

Electroforming with Iron
The EKKO Process

By Arthur W. Bull, J. W. Bishop, M. H. Orbaugh and E. H. Wallace
United States Rubber Company, Detroit, Michigan

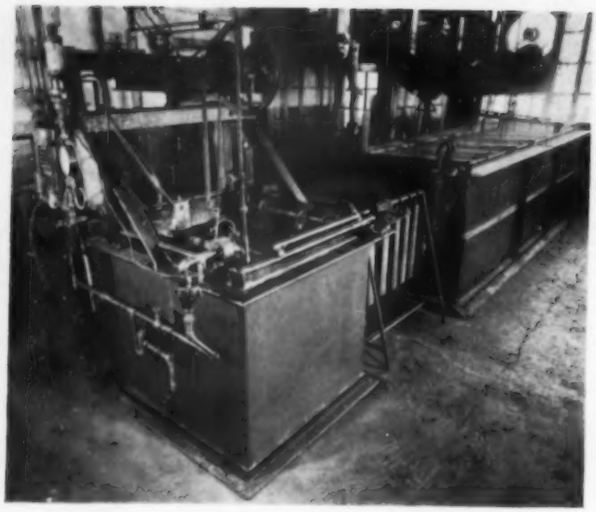
THE EKKO PROCESS is a new method for the preparation of molds and dies which grew out of researches by the United States Rubber Company on the production of cheaper tire molds. During the course of this development, but before tire molds were an accomplished fact, it became obvious that the method offered advantages to almost all industries using molds and dies. The molds and dies produced by the process effect a savings for the customer or permit him to produce more ornate and attractive articles hitherto prohibited by tool costs.

The application of the EKKO process to other than tire molds was investigated with increasing interest and success until early in 1939 when it was decided to establish within the United States Rubber Company a department making EKKO products available to industry at large. The Detroit Plant of the company was chosen as the site for this work as all of the original development had been done there.

The process produces molds and dies by electroforming iron against a pattern it is desired to reproduce. Electroforming is the same as electro-plating except that deposits up to ½-inch thick are produced instead of the 1/1000ths to 2/1000ths of an inch of metal applied by the usual electro-plating processes. Electro-plating is used for decorative purposes or to provide corrosion resistance while electroforming is used to build up a mass of metal.

When heavy electroformed deposits of iron are separated from the underlying pattern, a cavity or die insert is obtained which has reproduced the shape and surface finish of the pattern in every detail. This cavity or die when properly mounted may be used to mold or stamp objects the exact shape of the original pattern. The name EKKO is a phonetic spelling of "echo" suggestive of the duplicating nature of the process.

Figure 1 indicates how the process works in the preparation of tire molds. In the illustration, "A" shows a mold made by the usual process of engraving where the tread design and cavity are cut out of a steel forging with special engraving machines. The steel forging is later mounted in a cast iron back, called a watch case. These molds weigh around 600



Apparatus used in the Ekko Process in which molds and dies are made by electroforming iron against a pattern.

pounds and require at least 165 man hours labor to produce. One mold as shown is produced by engraving and reproduced as many times as desired by electroforming. The engraved mold, after the addition of a spacer ring (which is visible in the illustration), is used to mold the pattern which is later covered with iron by electrodeposition.

An electroformed pattern or matrix which has been obtained from an engraved mold is shown by "B." That portion of the tread design having extra width is caused by the spacer ring in the original mold and provides extra material at the parting line for the machining operation which separates the electroformed cavities from the pattern. If no extra material was provided at the parting line any tool used to cut open the two halves would remove some metal thereby giving shallow cavities. The pattern is rendered conductive by dusting it with powdered graphite and polishing it vigorously with a light brush. The polishing operation adds to the finish obtained on the electroformed cavity.

"C" shows a half of an electroformed cavity grown to a thickness of ⅜ths of an inch and separated from the pattern. Such a shell represents approximately 100 pounds of electrodeposited iron. The roughness on the outside of the shell is characteristic of heavy electrodeposits. The finish inside the cavity is identical with that of the pattern from which it was obtained. The back of the electroformed shell is then machined to a desired shape.

The final illustration in Fig. 1, that marked "D," shows half of a mold ready for use after the electroformed shell has been fitted into a properly machined cavity in the watch case back. The electroformed shell is held in place at a few points by welding. Figure 2 shows a section of a tire mold after it has come from the bath and the same section after it has been given an aluminum backing. The electroformed tire mold can be made at a considerable saving over the engraved mold because it requires considerably less labor and can be mounted in watch cases already available from obsoleted molds.

The iron produced by the electroforming process is 99.98% pure and substantially free from porosity. When plated it is about 50% harder than cold rolled steel and gives a scleroscope reading of 37 or a Brinell reading of 240. The metal can be softened to the normal value of pure iron by annealing or hardened by carburizing so that it will scratch glass.

Electrolytic iron has a heat conductivity nearly twice that of cast iron or steel. This is a special advantage in molding operations where a high rate of heat transfer is desirable. Patterns upon which to deposit the iron need not be of rubber as in the preparation of tire patterns. Provided the surface is made conducting, wood, glass, plastics, or similar materials may be used. Any metal is satisfactory with the exception of zinc and aluminum which are attacked by the plating bath.

One of the first applications of the electroforming process to other than tire molds was the preparation of a sponge rubber hand for a young girl who had been in an automobile accident. The usual type of artificial member fastened on with braces over the shoulder was entirely unsatisfactory in this case as

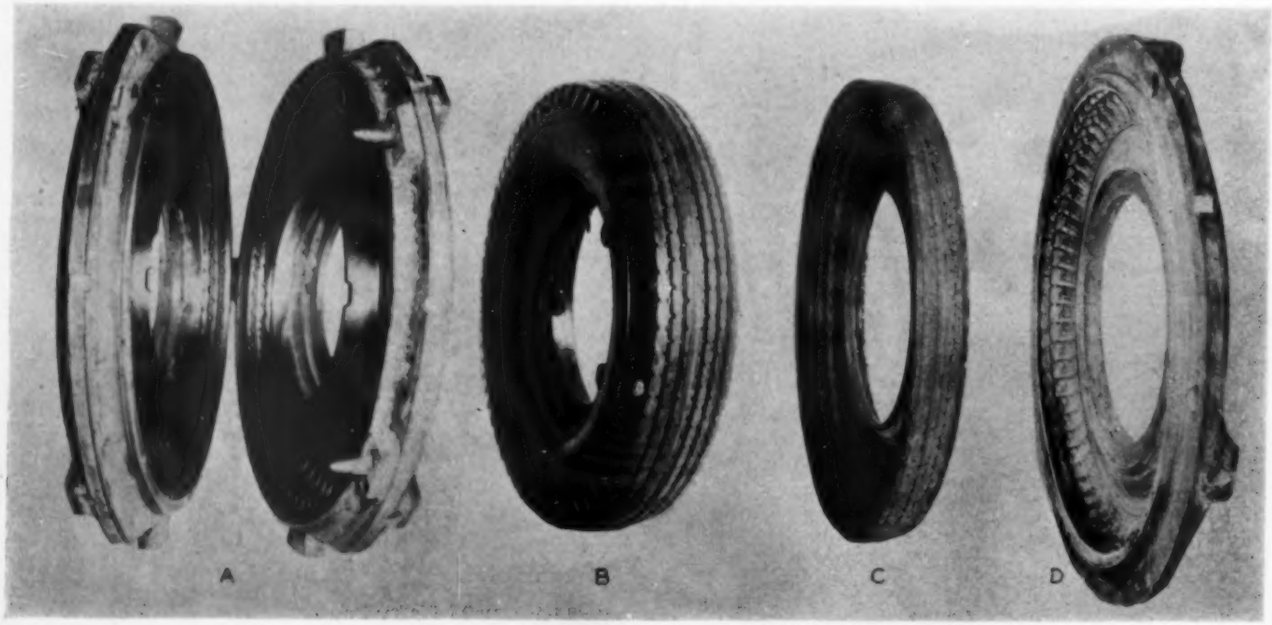


FIG. 1—Steps in the preparation of a tire mold by the Ekko Process. See text for description of steps illustrated.

FIG. 2—Section of a tire mold after it has come from the bath (right) and the same section with an aluminum backing.

the young lady would have found it impossible to wear short-sleeved dresses. It is doubtful whether long-sleeved dresses would have concealed the braces effectively. Furthermore, most artificial members are heavy, cumbersome, and expensive.

In this particular case the young lady had a sculptor friend who approached the United States Rubber Company to determine if there was a form of rubber which could be modeled in the same manner as clay or plaster. It was explained that rubber required molding and that the mold to duplicate a rubber hand would be prohibitively expensive; however, that a process was under development for the preparation of cheap molds and the company would be willing to attempt the preparation of the required cavity on an experimental basis.

Following our recommendations the sculptor prepared in plaster of paris the reproduction of the missing hand, correct in every detail. This plaster of paris reproduction was used as a pattern to electroform an iron mold, seen in Fig. 3. Before molding the rubber hand, an insert corresponding to the stump on the injured arm was placed in the mold so that the rubber would cure around it. After the preparation of the hand the insert was removed leaving a cavity which was a perfect fit for the stump. The hand, made of sponge rubber which provided lightness and sufficient resilience, was tinted to match the natural coloration in the skin. The gauntlet type mounting required no straps or braces but permitted the wearer to open doors and drive a car.

Since the successful preparation of the sponge rubber hand mold which indicated the desirability of electroforming in the rubber industry, the Ekko process has found application in the plastics, glass, embossing and metal stamping industries. A few of these applications will be briefly described.

Plastics: Using a Bakelite radio dial as a pattern a cavity was electroformed. The plated metal is approximately ¼-inch thick and can be mounted for use by machining the back to a suitable shape and inserting the electroformed cavity into a steel block which has been hollowed out to receive it. The other half of the mold is prepared and mounted in the same manner. The dial scale and numbers are raised in the mold, a condition which is difficult and costly to obtain by engraving as the metal surrounding each scale division or number must be cut away leaving the raised portions. By the electroforming process raised letters can be produced as easily as those depressed below the surface.

Glass: The dies used in the glass industry are subjected to very severe operating conditions. The Ekko process has a definite application in this field. Taking an engraved plunger used to stamp head light lenses from semi-molten glass a rubber negative was prepared from the plunger, the negative serving as a pattern from which an electroformed duplicate was made. The accurately machined face of such a die is difficult and costly to prepare by the usual method; with the electroforming process duplicates can be made very cheaply.

Embossing: As an application to the embossing trade the Ekko process can be used to prepare plates. In one case, a plate approximately ¼-inch thick, with a .005-inch nickel face, was prepared from an imitation leather master. This illustrates another possibility of the process wherein the pattern can be started in a nickel plating bath and after the deposition of a layer of nickel, plating can be continued in the regular iron bath. Nickel is slightly harder than the pure iron and this, combined with its non-corrosive properties, makes it ideal for such an application.

When the pattern consists of a porous material, such as leather, it is undesirable to place it directly in the hot bath as shrinkage and distortion will take place. In these cases the nickel bath can be used to advantage since it is operated at room temperature and the leather is more resistant to the electrolyte. Nickel faced molds are many times desirable in plastic molding and are usually obtained by plating .001-inch or .002-inch of nickel into the finished cavity. This causes a slight alteration in dimensions unless provision has been made for the nickel when the cavities were engraved. With the method outlined above a much heavier nickel face can be applied to a cavity without altering the dimensions.

Metal Stamping: The Ekko process is adequately suited to the preparation of dies and forces used in the metal stamping industry. A die and force was electroformed directly from a handmade bon bon dish. Dishes such as that used for the pattern for the dies made owe considerable of their value to the fact that they are handmade and contain small inperfections and tool marks left by the craftsman. Electroformed dies made from such patterns contain all the marks of the handmade articles and can, therefore, produce in simple stamping operations exact

FIG. 3—Both halves of an iron mold of a human hand electroformed from a plaster of paris form (shown at right).

FIG. 4—Section of a jacketed mold. Curved section at top is a cavity formed from half of a rubber ball.

duplicates of dishes made by hand. For stamping soft metal dishes, the dies can be mounted in a satisfactory manner by casting zinc alloys on the back.

In another experiment, a die was electroformed from a sandwich tray 14 inches long. This die was hardened with no apparent distortion and has performed satisfactorily in service. Many other experiments have been conducted in the preparation of dies and forces for metal stamping work.

Jacketed Molds Also Possible

An interesting possibility of the new process is shown in the section of a jacketed mold in Fig. 4. The curved section at the top is a cavity formed from half of a rubber ball as a pattern. On the back of the electroformed cavity a low melting alloy was cast and machined to a shape corresponding to the steam chamber. The object was then returned to the plating bath and a ¼-inch layer of iron deposited over the alloy. Two holes were drilled through the bottom plate to permit the alloy to flow out when the mold was heated. The mold was then cut through the center to give the sample shown in the illustration. Although in this case a jacket was applied by electroforming to a mold having very simple contours, the same method can be applied to irregularly shaped cavities where it would be impossible by ordinary methods to apply such an outer wall.

Another feature of steam or water cooling jackets applied in this manner is the possibility of providing an inner lining of non-corrosive nickel. For instance, if the original cavity in the sample mentioned above had been nickel plated on the outside before the application of the alloy and then nickel plated again before the deposition of the iron upon the alloy the resulting chamber would have been nickel lined.

For the preparation of decorative designs and figures in relatively shallow relief it is not necessary for the customer to supply a three-dimensional pattern for the Ekko process. We are able, through the Ford Ceramic Arts Process, to have a three-dimensional relief made in plaster from a photographic negative or black and white drawing, and this in turn can be used as a master for the electroforming process.

1939 Rubber Red Book ADDENDA and ERRATA

To help you keep your copy of the 1939 RUBBER RED BOOK directory correct and up-to-date, this column will be published from time to time. Additional current information can be obtained regularly from the feature and news pages of each issue of THE RUBBER AGE.

Page

12 Allied Rubber & Proofing Co. Delete. Out of business. Also delete under "Finished Products", and "Fabrics in General" on page 99; and under "Brooklyn" on page 118.

15 Armstrong Cork Co. Delete data on Keyport plant. Also delete under "Keyport" on page 117.

17 Automotive Rubber, Inc. Change address to 8601 Epworth Blvd. Change also under "Detroit" on page 116.

38 Morris F. Hamza. Delete. Out of rubber business. Also delete under "Latex Products" on page 85; under "Drug Sundries" on page 76; and under "West New York" on page 118.

44 Charles Lachman Co. Omit Philadelphia office. Also delete under "Philadelphia" on page 123. Delete also "general offices at Philadelphia" under "Phoenixville" on page 124.

50 Neptune Rubber Mfg. Co. Delete. Out of business. Also delete under "Bathing Apparel" on page 73; under "Gloves" on page 79; under "Sporting Goods" on page 103; under "Toys and Novelties" on page 107; and under "Trenton" on page 118.

51 New Process Rubber Co. Delete. Out of business. Also delete under "Hard Rubber Goods" on page 80; and under "Plymouth" on page 116.

59 Rubber Products, Inc. Change address to 2066 Canalport Ave. Change also under "Chicago" on page 112.

64 Star Textile Combining Corp. Delete. Out of business. Also delete under "Proofed Goods" on page 100; and under "Brooklyn" on page 119.

65 Supreme Mfg. Co. Delete. Out of business. Also delete under "Mechanical Goods-Miscellaneous" on page 97; and under "San Francisco" on page 111.

275 General Plastics, Inc. Change name to Durez Plastics and Chemicals, Inc. Also change under "Lacquers and Varnishes" on page 242.

277 New Hampshire Wood Flour Co. Delete. Out of business. Also delete under "Wood Flour" on page 240.

294 Lebanon Mill Co. Delete. Out of business. Also delete under "Jersey Cloth" on page 287; under "Knitted Fabrics" on page 287; and under "Liner Cloths" and "Napped Fabrics" on page 288.

319 Bay Ridge Rubber Co. Out of business. Delete under "Milled and Washed Rubber."

Tenasco Rayon Yarn

A NEW class of high tenacity yarns made by a modification of the ordinary viscose spinning process was recently introduced under the name of Tenasco by Courtaulds, Ltd., London, England. In the production of the new yarn the conditions of stretch spinning are chosen so as to yield a dry tenacity considerably higher than normal, with an extensibility which can be suited to the purpose for which it is required. The most highly stretched Tenasco, Type A, has a dry tenacity over 75% greater than ordinary rayon and a lower extensibility. The most extensive use of this type at present is in tire cords.

Use of Flocks in the Rubber Industry

By M. A. Foley*

2. Flock as a Surface Coating

SURFACE coating of rubberized fabrics with flock is not a new endeavor in proofed textiles. The past decade has seen numerous suede-like and pile surfaces introduced to the trade under different names, the popularity of each type fluctuating from year to year. The finished material has been put to varied uses, as in the manufacture of handbags, slippers, shoe fabrics, rainwear and sportswear. Many rubberizers have done considerable work on material of this type in the past few years, and the quality of the work being produced is highly satisfactory to the industry.

Styles of surfaces are numerous, and while in the past fibers such as wool, leather and cork were widely used, the popular types today are rayon and cotton and mixtures of both. Rayon of both viscose and acetate processes may be obtained for both pile and suede finishes. Brightness of color and soft feel are the main advantages of rayon. Cotton, still a popular finish, may be obtained in various lengths and feel variations, and the brightness of color which can be secured through proper dyeing procedures approximates that of rayon.

Mixtures of rayon and cotton which have been introduced to the market in recent years have produced fair results. During the past three years good automotive and furniture fabrics have been developed with the use of flock. Combinations of cotton, wool and rayon, and of wool and rayon, in addition to straight rayon, have been used in an attempt to achieve a fabric which will furnish good resistance to abrasion and proper anchorage so as to resist cleaning with organic chemicals.

Flocked fabrics are usually produced on a machine, the make-up of which consists of an adhesive applicator, flock distributor, beater arrangement, and drying oven. It is advisable that the flock distributor and the beater arrangement be hooded in the same unit to keep the flock in the system.

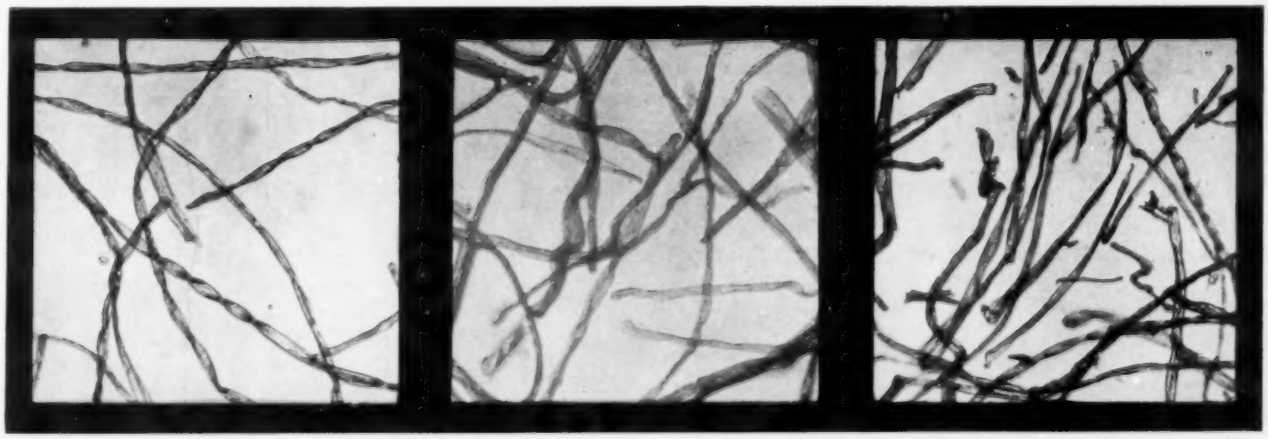
The fabric or surface to be coated passes through the adhesive applicator where it receives a uniform coating of wet adhesive. It then passes under the flock distributor which deposits the cut fiber onto the surface of the material to be coated while it is still wet and sticky. From the flock distributor the material is fed to the beater arrangement where the coated material is agitated, the excess fiber knocked off, the adhering fibers bonded firmly into the adhesive, and, in some cases, the fibers erected in their base. After this operation, the material passes through a drying oven in which all solvent is eliminated. The material is then either reeled in rolls to be cured by draping in an oven, or sent immediately around a drum vulcanizer.

The four major parts making up the flock fabric producing machine are as follows:

Adhesive Applicator: This is usually a conventional spreader hook-up with a doctor blade set on a rubber roll, but a pyroxylin coater may be used where the knife for adhesive regulation is set between two flat bars. In some factories a lick roll hook-up is used for the adhesive application, and operators of this method claim they secure more uniform coating results in production.

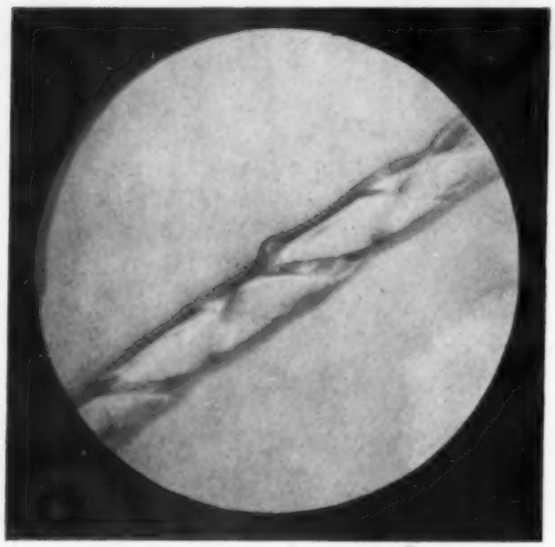
Flock Distributor: Four methods are advanced for flock distribution: (1) a hopper arrangement with brush applicator; (2) oscillating screen; (3) an airflow method; and (4) a hopper arrangement with a brush and screen hook-up. In the first method, the flock is carried in a hopper and deposited on the surface by means of two brushes rotating toward each other. In the second, the oscillating screen consists of a screen frame which holds the flock in until it is

* Rayon Processing Company of Rhode Island, Central Falls, R. I. The September, 1939, issue of RUBBER AGE contained an article on "Cotton Flock as a Filler" by the same author.



Raw | Brown Flock Untreated | Oakwood Tan Treated for Sifting

Photomicrographs of Cotton (150X)



Photomicrograph of Viscose Rayon (500X).

deposited upon the wet rubberized surface by oscillation of the screen by means of a cam arrangement.

The third, or air-flow method, is a balanced system which is completely enclosed and the flock is distributed on the surface of the material to be coated by air blast. The excess, which is beaten off into a hopper, is returned by suction to the distributor. The final method is a variation of the first method, where the two brushes, or in some cases a single brush, force the flock through a screen onto the rubberized surface.

Beater Arrangement: Beaters can be classified as (a) lawn mower type; (b) right angle type; and (c) drum type. The lawn mower type consists of warped wooden pieces twisted about a core in a wave effect. It gives a rippling action to the coated surface and is not as severe on material as are the other two types. The right angle type of beater is four-bladed, the blades being of wood or metal and set at right angles to each other. The drum hook-up is of wood with raised portions placed on the drum surface at equal distances from each other. The beating surface extends naturally across the entire width of the coated surface.

The beating action is generally arranged to work against the fabric. In some cases, however, it has been found advisable to place a heavy piece of duck or blanket between the beaters and the coated material in order to soften the action of the beaters. The beaters can be hooked up with varying speed controls so that their action can be slowed down or speeded up in relation to the movement of the material being coated. The beating action is believed by many manufacturers to be the key to good flocking, and there is absolutely no doubt but that this phase of flocking is very important in the manufacture of a uniform product.

Drying Oven: Any number of drying oven systems may be adapted for the processing of flocked fabrics. The actual curing or vulcanizing of the material after the solvent has been removed may be carried out in ovens or on a drum after the material has been dried and brushed. Brushing can be accomplished in the machine, preferably after the drying procedure.

Numerous compounds are used for a suitable adhesive in the surface coating of fabrics with flock. Many of these have bases of lacquer, rubber or latex. Several of the larger lacquer companies have formulated special adhesives for use in this application.

Most rubberizers, however, prefer to formulate their own naphtha cements, one formula being:

Rubber	50.000
Sulfur	.500
Mercaptobenzothiazole	.500
Tellurium	.250
Zinc Dimethyldithiocarbamate	.125
Stearic Acid	.500
Zinc Oxide	2.500
Whiting	37.500
Soft Clay	25.000
Antioxidant	.500
	117.375

Cure: 2 hours at 255° F.

The rubber is plasticized so that when the stock is cut in naphtha, which contains a small amount of wetting agent, to a solids of approximately 35%, a viscosity of four minutes will be reached using ball and tube viscosity method.

The compound cited will give a finished product which furnishes good anchorage to rayon, wool and cotton, and fair resistance to the action of such cleaning agents as naphtha, gasoline or carbon tetrachloride. To secure uniform results, strict control of viscosity and solids must be maintained in all runs. This stock is not stable to aging in the churned state and sulfur should be held out until the stock is to be actually used in production.

Flock cloth manufactured by the mechanical method outlined has wonderful possibilities for future development, and the interest shown in its manufacture by many textile companies clearly shows its promise. Considerable work has been, and is being, done on other methods for producing flocked cloth, but the mechanical method described prevails at present.

Automobile and furniture fabrics will undoubtedly increase the volume of flocked fabrics produced in the early future, and these cover both fabrics with pile appearance which can be produced with a uniform cut fiber and broadcloth assimilations produced with irregular cut stock. The production of uniform cut fibers is covered by U.S. Pat. 2,014,947, assigned to the Rayon Processing Company of Rhode Island.

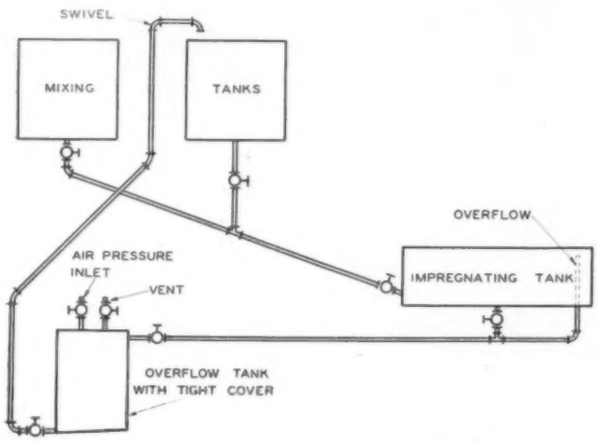
It is the hope of all those interested in the manufacture of flock and finished flock fabrics that the development work on new styles will keep flock in its merited place as a coating in the rubber industry.

Photomicrograph of Green Raycote Plush Finish (35X).

Suggestions for Storing and Handling Latex in the Factory

NO MANUFACTURER can successfully produce goods from latex unless he has given some thought to the mechanical problems of storage, mixing and processing. If a manufacturer will install his equipment simply and efficiently he will do much to avoid losses of various kinds. The following suggestions, taken from the September-October, 1939, issue of "The Vanderbilt News," are intended to apply to a moderately large scale unit.

Whether latex is received in barrels or tank cars, the conditions of storage before using are important. Wherever factory consumption permits, latex is usually bought by tank car lots and stored in the factory in large iron or steel tanks. The fact that less metal surface is exposed to the latex in large tanks than in metal barrels is of special importance when this latex is used for white articles. Latex in contact with iron for a long period of time becomes grayish in color.



Design for Latex Impregnating and Coating Equipment

When bulking in large tanks, this discoloration may be substantially eliminated by cleaning the tanks after emptying and coating them internally with paraffin wax. As latex tends to cream upon standing it should always be agitated, either mechanically in the case of small drums, or by air where the quantities are larger.

Latex should be stored in as cool a place as possible with precautions taken against freezing. Under no conditions should latex be stored near steam pipes or other heat, and freezing produces a latex which upon thawing is either entirely worthless or at least inferior.

Latex is best conveyed from barrels or storage tanks to mixing tanks by gravity, wherever possible. The use of compressed air is the second most practical method. Only special type pumps can be used and such practice is nearly non-existant. In using compressed air, care must be taken that the supply tanks and pipe lines are sufficiently strong and then only the lowest pressure necessary should be used.

Pipe lines should contain as few elbows, unions and valves as possible. Of course some unions should be present so that lines may be taken apart for cleaning when necessary. *It cannot be over-emphasized that no copper, brass or other copper bearing alloy should be in any of the equipment.* Quick opening iron valves may be obtained which can be cleaned easily. When pipe lines or tanks are wholly or partially empty all valves should be closed so that ammonia may not escape and allow coagulation to take place.

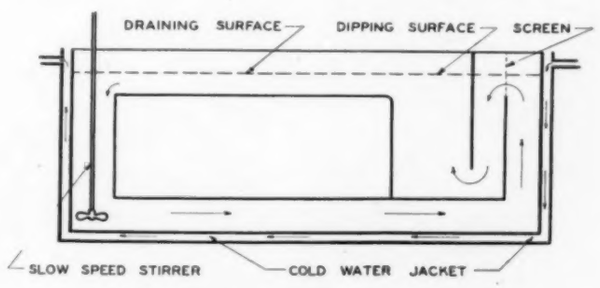
Careful planning of the path of latex pipe lines in the factory may avoid later trouble. Best results are obtained by running the pipes close to the floor or through the basement instead of overhead. At points where heat is likely pipe lines should be insulated.

At least two mixing tanks should be provided so that fresh material may be made in one while the other tank is being used. These should contain agitators suspended from the top, which travel about 40 r.p.m. All tanks are constructed preferably of stainless steel, but may be made of iron. The tanks are best located so that the compounded latex flows by gravity to the point of application. Air bubbles may be minimized by letting the latex enter the pan or bath on an inclined tray which extends directly into the latex already present.

Open tanks containing the compounded latex ready for application are built so that the least amount of latex necessary is present and so that a minimum amount of compound is left at the end of a day or when changing from one compound to another. Dried or coagulated rubber is reduced by water cooling the bath by means of a jacket and where rolls are constantly turning in the latex, they may be hollow and also water cooled. Of course the dryer should be well insulated to prevent hot air from striking the bath.

A constant level is many times important in the latex bath and may be obtained by having an overflow. The movement of the latex reduces settling of compounding materials in addition to preventing surface skinning. Dipping tanks are so constructed that the mix is agitated at all times. The surface of the bath moves slowly away from the point of dipping so that a surface free from air bubbles is available for each succeeding dip. Above is a drawing of a practical arrangement for mixing tanks and latex bath. The overflow from the bath is collected in a drum from which it is forced by the low air pressure up into the mixing tank and used again.

In the same issue of "Vanderbilt News" reference was made to the effect of storage temperature on the thickening of latex. In commercial practice the greatest trouble is usually experienced in summer. Much of this trouble can be eliminated, according to the article, by first planning the dipping tanks and second by having the dipping tanks jacketed for circulating tap or refrigerated water. The accompanying design for a suitable dipping tank is reproduced from the article.



Design for Dipping Tank

X-Ray Diffraction Patterns of Rubber

WHEN total rubber of *Hevea brasiliensis*, that is, rubber which has not been separated into its sol and gel fractions, is stretched quickly and exposed to a beam of X-rays, a crystal-fiber diffraction pattern is obtained. During X-ray studies of this rubber, conducted jointly by the National Bureau of Standards and the University of Illinois, no pattern was produced by stretched sol rubber. However, with stretched gel rubber the pattern was sharp and intense. The sol fraction is more mobile than the gel, and the crystalline structure, produced by stretching, is presumed to disappear before a pattern can be obtained.

Rubber from *Manihot glaziovii* also may be separated into sol and gel fractions, and in recent work these fractions were stretched and examined by X-rays. With the stretched Manihot sol, a few interferences were obtained but, as in the previous case, many more resulted with stretched gel. When crystallized by "freezing" at low temperatures for 24 hours, the interferences from the gel outnumbered those from the sol, which indicated that the gel crystallizes with greater ease than the sol. Manihot rubber has been described in the literature as a tough form of crude rubber. Its differing behavior toward X-rays, when compared with the rubber of *Hevea brasiliensis*, is supposed to result from the low mobility occasioned by its toughness, that is, its resistance to an impressed force and its low plastic flow.

The X-ray measurements of Manihot rubber agree with those of Hevea rubber, the ordinary rubber of commerce, and indicate that the structure of each is the same. Three other natural rubbers, obtained from lattices of *Funtumia elastica, Cryptostegia grandiflora,* and *Castilla elastica,* were also examined, and X-ray measurements indicated that their structures also are like that of Hevea, and check earlier observations made when X-ray technique was less highly developed. In crystallized specimens of these rubbers, crystals melted within the temperature range previously observed with Hevea rubber.

A large spacing was found in earlier studies of unstretched Hevea gel rubber. This spacing has been observed also in a new specimen of stretched Hevea gel rubber, together with a second spacing approximately twice as large. This entire work is reported on in detail by Messrs. Clark, Gross and Smith in the July, 1939, issue of the *Journal of Research*, published by the National Bureau of Standards, Washington, D. C.

Non-Blooming Camelback

A LONGER lived retreaded tire without defects is said to be made possible by the use of a newly-developed non-blooming camelback, specially adapted to retreading and tread-capping, just introduced by the Firestone Tire & Rubber Co., Akron, Ohio. Dispensing with the sulfur method which caused the common defects of sulfur spots, imperfect tread molding, low spots, and other tread weaknesses, the Firestone discovery uses Mutac (a new ingredient) to assure users of retreaded tires that the non-blooming camelback will maintain a fresh, black appearance by eliminating the migration of the sulfur particles—the cause of blooming. Mutac is said to make the rubber less susceptible to under-cure and relatively unaffected by over-cure. It is also said to promote free-flowing in the molds thus furthering sharp, clean tread designs, safeguards against skidding.

New Amines for Rubber

SINCE the first amine was synthesized by Wohler one hundred years ago, chemists have succeeded in substituting the NH group for the oxygen atom in almost every oxygenated organic compound. Thus, alcohols have been changed to amines, ethers to imines, and glycols to diamines. Although these analogs have sufficiently different and valuable properties to indicate great industrial possibilities, only half a dozen amines have become commercially important. Recent developments in the chemistry of emulsifiers, detergents and other materials have created a demand for new nitrogen compounds. The following amines, of interest to the rubber industry, made possible by synthesis, have recently been made available commercially by the Carbide and Carbon Chemicals Corp., New York City.

Ethanolamines: These are colorless, viscous and hygroscopic liquids, quite active chemically, entering into synthesis by esterification of the hydroxyl groups or by condensation with aldehydes. They are particularly useful in the recovery and purification of various gases, and combine with free fatty acids to form neutral soaps which make excellent emulsifying agents for polishes, leather compounds, etc. They also make good solvents or dispersing agents for such organic substances as rubber, shellac and casein.

Diethylene Triamine: This is a hygroscopic, somewhat viscous liquid, completely soluble in water. It is an alkaline, high-boiling solvent for sulfur, acid gases, various resins and dyes. It will saponify acidic materials, such as fatty acids, to form soaps which dehydrate to amides. It has derivatives which are of special interest to the rubber, resin and textile industries.

Latex on Polished Aluminum

A FILM of rubber applied in the form of latex is sometimes used as a means of protecting the polished surfaces of metallic mirrors and similar articles from scratches and dust while in storage and during shipment. When ordinary commercial latex is applied to polished aluminum, however, a bluish discoloration is produced which remains when the film of rubber is stripped off. Tests recently conducted at the National Bureau of Standards, in Washington, D. C., to ascertain the cause of this discoloration indicated that it was produced, not by the rubber, but by ammonia which is almost universally employed as a latex preservative. When the ammonia is removed by dialysis through a cellophane membrane, latex no longer discolors aluminum. Ammonia-free latex preserved by the addition of the requisite amount of pure formaldehyde is likewise without action on aluminum.

Care of Rubber Tubes

SIGNIFICANT findings on the value of glycerine in the preservation of rubber was reported in a recent issue of the *American Journal of Nursing* as follows: In a series of experiments on the relative value of glycerine and mineral oil in the preservation of rubber used in catheterization it was found that after 37 boilings rubber tubes which had been lubricated with mineral oil were so non-resilient that they were no longer usable. On the other hand tubes lubricated with glycerine were firm and though slightly lighter still resilient after 200 boilings. In these experiments the tubes were lubricated for five minutes with the substance under test. They were then washed with soap solution, rinsed, and boiled for five minutes.

New Technique in Glove Testing

Direct-Current, High-Voltage Application Promises to Reduce Percentage of Rejections Safely with Test Burden Lessened

By R. W. Chadbourn and W. H. Meade, Jr.
Boston Edison Laboratory

FROM experimentation in testing about 800 rubber gloves with direct instead of alternating current the following conclusions appear:

1. High-voltage d.c. is more effective than high-voltage a.c. in picking out defects of moderate seriousness, which may develop into hazards.

2. Leakage measurements of high-voltage d.c. may be of much greater value than corresponding measurements on high-voltage a.c. Further investigation is needed before the importance of d.c. leakage measurements can be properly evaluated.

3. Adoption of high-voltage d.c. testing will reduce tremendously the arduousness of inspection and result in a saving, for further use, of 50 to 75 per cent of the gloves being condemned by present standards.

4. This will be accomplished without lowering the factor of safety on the use of gloves, as the tests indicate that 45 kv. d.c. is a much more severe test than 10 kv. a.c. The d.c. test appears to pick out defects serious enough to be classed as potential hazards, whereas the a.c. test only picks out defects if they are serious enough to break down at less than 5 kv.

5. The gloves do not appear to be injured by the high voltage d.c.

6. A one-minute application of the high-voltage d.c. appears adequate to pick out the more serious defects. Longer applications in general only result in breakdown of the rubber at its thinnest point.

It has long been recognized that a routine test of 10,000 volts a.c., made at intervals determined by the character of the service, is not, in itself, a satisfactory check on the condition of rubber gloves used on distribution circuits. For years many companies have laid more stress on a careful visual inspection and have used the 10,000-volt test chiefly as a final check on the inspectors. Chief reliance on visual inspection has many disadvantages. Unless men are alternated frequently between glove inspection and other types of work the inspection becomes extremely tedious. As a result, it is difficult, if not impossible, for a man to maintain continuously the same standard of judgment. Unless the inspection requirements are made very rigid it is impossible to set up an inspection standard which different inspectors can follow consistently.

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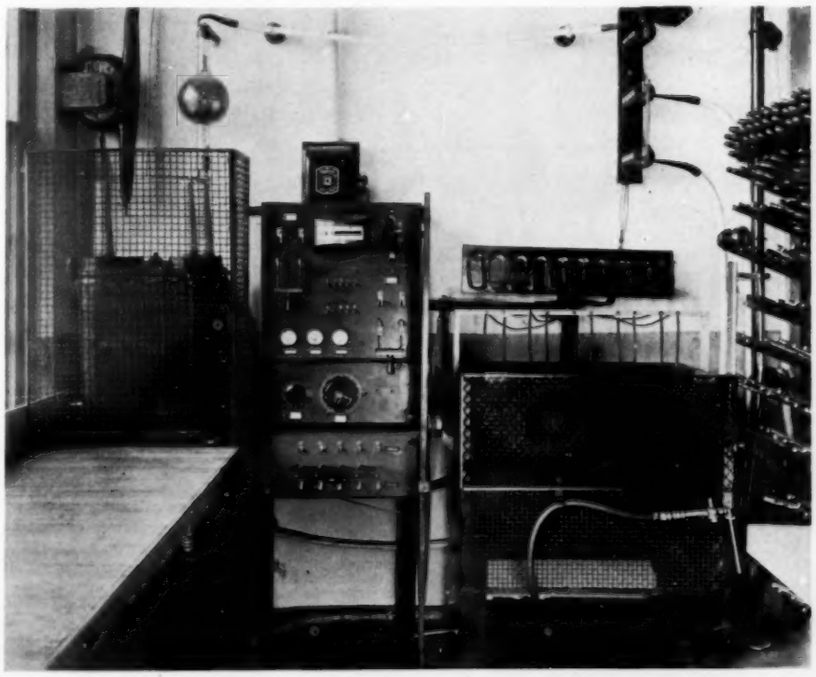


Fig. 1—Test equipment layout for a.c. and d.c. applications in the Boston Edison Laboratory.

Because of these difficulties, the Boston Edison Company for many years pursued the policy of fairly frequent rotation of inspectors and very rigid inspection requirements. The company felt that the 10,000-volt test could not be depended upon to pick out defects which might develop into hazards, and that defects could not be satisfactorily classified as major and minor, or serious and trivial, merely by inspection of the part of the defect exposed to view. Gloves were accordingly rejected for *all* visible defects, major and minor.

Accident Hazard Reduced to Minimum

This policy, of course, resulted in a high percentage of rejection, approximately 23 per cent, but reduced the accident hazard to a minimum. It was recognized that many of the gloves rejected were satisfactory for further service, but until a more satisfactory test and inspection standard could be devised it was felt undesirable to risk lowering the factor of safety.

Experience in testing other rubber products, notably rubber-insulated cable, had shown that high-voltage d.c. is more effective in picking out incipient faults than high-voltage a.c. It was thought that the use of high voltage d.c. for testing rubber gloves might be so successful in picking out incipient weaknesses in the gloves that a considerable percentage of those being condemned by inspection could be reclaimed for further use without any decrease in the factor of safety.

For the investigation, a number of gloves that had been condemned by inspection were selected. From these were excluded those having very glaring faults. The first step consisted in subjecting a number of the remaining gloves, chosen at random, to the usual 10,000-volt a.c. test, then raising the voltage slowly up to breakdown. Another group of the remaining gloves, also picked at random, was tested on d.c., voltage being raised at the rate of 5 kv. per second from zero to failure. For this purpose a single kenotron tube was used, Fig. 1, with sufficient capacitive ballast to limit the ripple to 3 per cent. These tests resulted as follows:

	Total Tested	Flashed Over	Punctured Through Defect	Punctured Outside Defect
A.c.	36	6	2	28
D.c.	35	19	14	2

These preliminary tests indicated a rather marked superiority of the d.c. in picking out defects. The two gloves tested on d.c. that broke down outside the defect for which they were condemned probably failed at concealed defects, evidence of which was destroyed by the breakdown, as the voltage of failure was low. The water levels, on test, were adjusted to permit flashover at about 52 kv. D.c. breakdown values ranged from 19 to 52 kv.

To determine whether the time of application of voltage on these short-time d.c. tests was adequate to pick out all defects which might be considered serious, long-time tests were made on fifteen of the nineteen gloves which flashed over; 25 kv. was applied for five minutes and the voltage increased in steps of 5 kv. every five minutes until breakdown occurred; of these fifteen, three flashed over, two punctured at the defect for which they were condemned and the remaining ten punctured outside the defect.

Measurements of thickness were then made on these last ten both at the point of failure and at the defect. In all cases the thickness was less at the point of failure than at the defect, in amounts varying from 5 to 27 per cent, the average deviation being 15 per cent. These tests indicated that, as a substitute for or an aid to the process of visual inspection, the longer test period was of little value, and that the short-time test, in which the voltage was raised at 5 kv. per second from zero to failure, was adequate to pick out defects of a serious nature.

Increase in Power Factor Recorded

The question was then raised as to whether application of a high d.c. stress injured the gloves. To determine this six gloves were immersed in water and one-minute applications of 50-kv. d.c. were made every three minutes on four of them. After each application of d.c. the power factor was measured. At intervals, the power factor of the other two gloves was determined. The results of these tests are shown in Fig. 2. Of the six gloves, 1 and 2, 3 and 4 and 5 and 6 were similar. Gloves 2 and 5 were not energized with d.c. All the gloves show an increase in power factor, and it is of interest to note that the rate of increase is the same for corresponding gloves of the same pair, although one was subjected to d.c. and the other not.

At the conclusion of the d.c. tests the gloves were dried out for two days and a final power factor test made. In every case the power factor was almost ex-

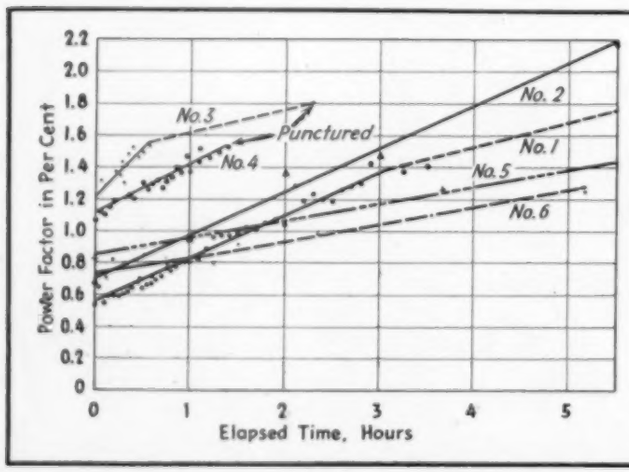


Fig. 2—Time-power factor relationship on 50-kv., d.c. applications.

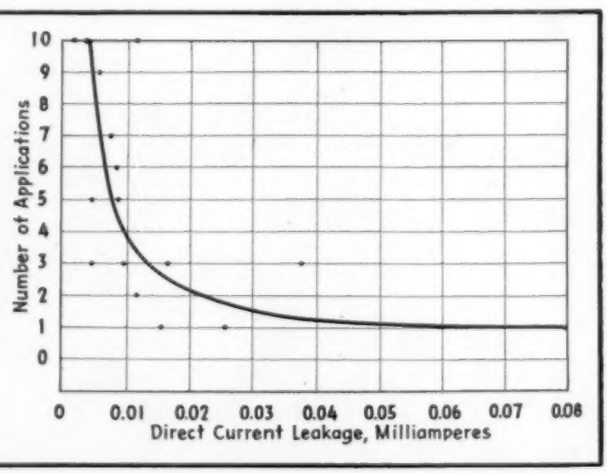


Fig. 3—Relation between leakage and breakdown for repeated d.c. high-voltage applications.

Fig. 4 (Left)—Section of rubber glove with cut of predetermined depth tested to failure on d.c.

Fig. 5 (Right)—Section as in Fig. 4 tested to failure on a.c.

actly the same as at the beginning of the tests. These tests indicated that, so long as the gloves are immersed in water, the power factor shows a gradual increase, caused by gradual absorption of water, but that the application of repeated unidirectional stresses has negligible effect upon the power factor. It was concluded, therefore, that the gloves were undamaged by the high voltage d.c.

The possibility of using leakage current as a criterion of condition was also considered. It was felt that d.c. leakage would change far more rapidly with change in glove conditions than would a.c. leakage, as the latter consists largely of charging current, which is not much altered by the development of defects. A series of d.c. leakage measurements was made on a small group of gloves and the gloves were then subjected to repeated applications of 50 kv. d.c. until breakdown occurred. The results are shown in Fig. 3. In spite of the small number of gloves thus tested, there appears to be a very definite relation between leakage and the dielectric strength.

These preliminary tests with d.c. indicated that the company's inspection standard might be materially lowered and a large percentage of gloves formerly condemned now salvaged for further use, without any lowering of the factor of safety and with some decrease in the labor of testing. To obtain further data several hundred gloves previously condemned by the company's rigid inspection were subjected to the following procedure:

1. The gloves were given a d.c. test, voltage being raised from zero to 30 kv. at the rate of 5 kv. per second. Leakage measurements were made at that voltage. The voltage was then raised at the same rate to 45 kv., held at that value for one minute and then removed.

2. The gloves were then subjected to the usual a.c. test of 10 kv. These tests resulted as follows:

Total number of gloves tested	390
Number of gloves containing so-called major defects	133
Number of gloves containing so-called minor defects	257
Number of breakdowns in gloves containing major defects	58
Number of breakdowns in gloves containing minor defects	30
Total breakdowns	88
Per cent breakdowns of total tested	22.6
Number of breakdowns through defects	68
Number of breakdowns through spots other than defect	20
Number of breakdowns on a.c. high potential test	0

Another group of gloves from the same lot was subjected to similar tests, with the order reversed, the 10 kv. a.c. test being applied before the 45 kv. d.c. test. The results of these tests follow:

Total number of gloves tested	296
Number of gloves failing on a.c. test	20
Number of gloves failing on d.c. test	41
Total breakdowns	61
Per cent breakdowns of total tested	20.6
A.c. breakdowns through defects	15
D.c. breakdowns through defects	37
A.c. breakdowns through spots other than defect	5
D.c. breakdowns through spots other than defect	4
A.c. breakdowns below 5 kv.	14
A.c. breakdowns below 5 kv. through defects	14
A.c. breakdowns above 5 kv.	6
A.c. breakdowns above 5 kv. through defects	1

At first glance, these last results seem inconsistent with the results of d.c. and a.c. tests quoted earlier in the article. It is significant, however, that, of 20 a.c. breakdowns, fourteen occurred at less than 5 kv., each through a glaring defect. Defects of this magnitude were excluded from the first set of tests. Of the remaining six a.c. breakdowns, only one occurred through the defect for which the glove was condemned. This is in line with the previous tests.

The superiority of d.c. over a.c. in picking out defects of moderate seriousness is illustrated in Figs. 4 and 5. Cuts of identical depth were made in two similar specimens and each specimen tested between 2-in. disk electrodes, one on d.c. and the other on a.c., to the point of breakdown. On d.c. the test specimen failed in the cut; on a.c., breakdown took place some distance away from the cut. The failure of a.c. to pick defects appears quite pronounced until the defect becomes so bad that its dielectric strength is reduced to a value of less than 5 kv.

Commercial Importance of Tests

More test data are of course desirable before existing test standards are altered, and this is being accumulated as fast as possible. The information so far obtained indicates that a cursory inspection, eliminating all gloves with very bad defects, followed by the d.c. test on the remaining gloves, will constitute an adequate test program. If, as the tests to date indicate, the percentage of rejections can thereby be reduced from 23 to a 5 to 10 range with a marked reduction in the arduousness of testing, and a possible reduction in the time of testing, the proposition assumes considerable commercial importance.

Rubber Bump-Air-Gards

THE answer to the demand for some type of a rubber bumper on automobiles seems to be found in a device recently perfected by R. B. Fageol, 231 South Spalding Drive, Beverly Hills, California. The new device, called Bump-Air-Gard, is a rubber cushioning which can be attached to present steel bumpers. It is

in the form of a miniature balloon tire, 10 x 4 inches, carrying 8 pounds of air pressure, made of pure rubber without fabric. Its construction provides a soft and elastic action in case of bumps in traffic or on curb parking, and it is especially recommended for use in "stop-and-go" traffic. Another feature is that when another car bumper overrides or hooks over the Bump-Air-Gard, it folds back and automatically unhooks when either car is moved in opposite directions. This is especially true when both cars are equipped with the new cushioning device. The inventor is a brother of the pioneer motor coach builders, Frank R. and William B. Fageol, operators of the Twin Coach Company at Kent, Ohio.

Unique Pump Utilizes Tubing

CORROSIVE liquids do not have a chance to attack the metal parts of an interesting new pump which has been recently introduced by Huber Pump Company, 90 West Street, New York City. This unit, designed to handle chemicals, foodstuffs, and corrosive and abrasive liquids, employs an entirely new principle of operation. In it, vacuum first sucks the liquid into flexible tubing, then pressure forces it out on the discharge side.

The tubing in the pump, rubber or neoprene as dictated by the liquid being handled, is confined within a casing which prevents the tubing from expanding beyond its normal diameter and length, even under high pressures. Vacuum created by the action of the pump draws liquid into the tubing. Then, this liquid is literally squeezed out of the tubing by pressure applied progressively from the intake to the discharge end.

The pressure on the tubing, or the squeezing, is accomplished by an eccentric rotor revolving within a circular compressor ring. This ring is so adjusted that it completely closes the tubing which is forced against it by the progressive action of the rotor. The tubing has a heavy elastic wall construction which enables it to spring back to its original form immediately after the rotor releases it, thereby creating a high vacuum on the suction side while a high pressure is being built up on the discharge side.

No stuffing box of any kind is required because the liquid being pumped is kept within the tube during its passage through the pump and the tubing is held in position on the suction and discharge ends by special tube retainers. This type of pump does not require any valves on the suction side to help maintain the vacuum as it is a positive, self-priming unit—an instant vacuum being created by the expansion of the empty tube.

The resilient materials used for the tubing have excellent resistance to abrasion and are not damaged materially by abrasive liquids. The rubber tubing can safely carry many substances which might attack metal or be contaminated by contact with the metal. When the liquids being carried have too severe an action on the rubber tubing, neoprene tubing is employed, and thus the field of application of the pump is widened to take in almost all commercial liquids.

New Powdered "Thiokol"

A NEW powdered "Thiokol," which sticks to metal like glue, has been announced by the Thiokol Corporation, Trenton, N. J. When sprayed, the new powder is said to lay evenly on metal and to form a continuous protective coating for it. Because this coating firmly keys itself into the surface it protects it is said to stand real punishment. The new powdered material is sprayed on metal by the Schori Gun, marketed in the United States by the Schori Process Corporation, Long Island City, N. Y. This "gun", developed in Belgium, was the first tool which enabled workmen to spray powdered protective metal coatings, and is widely used throughout Europe. As compressed air shoots the powdered "Thiokol" through the gun, a gas flame fuses the material and causes it to flow together on metal surfaces. Upon cooling, the powder forms a continuous film. Work now in progress is said to indicate that this film will be resistant to oils, greases and many acids and solvents.

Storing Rubber Belts

RUBBER belts which are out of use should, if possible, be removed from their pulleys and stored in a cool, dark place in which the temperature never exceeds 70° F., according to a recent item in *Textile World*. If the belt cannot be removed, the tension should be taken from it and it should then be treated with a solution containing 1 quart shellac, 1 pint alcohol, 1½ pints household ammonia, and 3 quarts of water. This solution should be applied to the belt with a brush, the whole belt being given a good coating, particularly any cut or exposed edges. This action will largely prevent deterioration of the rubber, according to the article, which so often spoils rubber or rubber-composition articles. The solution can with advantage be applied to any rubber or rubber-composition article, and has considerable preventive action, the article concludes.

An Index to Volume 45 of THE RUBBER AGE will be found in this issue facing page 66. These indexes are published in the April and October issues in each calendar year.

New By-Laws of Rubber Division, A. C. S.

Complete Text of the New Set of By-Laws Voted and Approved By Members of Division at Its Boston Meeting in September

THE meeting of the Rubber Division, A.C.S., held in Boston, Mass., the week of September 11th, during which the 100th anniversary of the discovery of vulcanization by Charles Goodyear was suitably commemorated, as narrated in our previous issue, also witnessed one of the most active business sessions held by the Division in many years. Not only was it decided to establish a Charles Goodyear Lecture and accept the important reports of several committees, including those concerned with crude rubber and nomenclature, but a complete new set of by-laws, drawn up by a committee headed by C. W. Christensen, treasurer of the Division, was given to the membership for consideration and approval. After a few questions were raised which clarified several points in the new by-laws, they were voted upon and unanimously approved. The complete text of the new by-laws is being published herewith:

BE IT RESOLVED, by the vote of two-thirds of the Members present at the annual meeting of The Division of Rubber Chemistry of the American Chemical Society (hereinafter called "The Division"), held this 15th day of September 1939 in the City of Boston, State of Massachusetts, that:

1. These By-Laws of The Division are subject to the Constitution and By-Laws of the American Chemical Society and supersede all motions, rules and by-laws of any nature whatsoever previously enacted by The Division which are in conflict herewith.

2. CLASSES OF MEMBERSHIP. The Membership of The Division shall comprise:

A. *Members.* Any member of the American Chemical Society may become a Member of The Division on payment of the annual dues of two dollars and fifty cents ($2.50). Only Members shall have the right to vote and hold office. Each Member shall receive "Rubber Chemistry and Technology" without additional cost, except that Members living outside of the United States shall pay mailing charges as prescribed by the Treasurer.

B. *Associate Members.* Any person may become an Associate Member on payment of annual dues of five dollars ($5.00). Associate Members are not members of the American Chemical Society and are entitled to none of its other privileges. They shall not be eligible to vote or hold office. Each Associate Member shall receive "Rubber Chemistry and Technology" without additional cost, except that Associate Members living outside of the United States shall pay mailing charges as prescribed by the Treasurer.

3. SUBSCRIPTIONS. Libraries and companies may subscribe to "Rubber Chemistry and Technology" at the rate of five dollars ($5.00) per year. Mailing charges shall be prescribed by the Treasurer for those libraries and companies outside of the United States.

Members of all classes shall be automatically dropped from the Membership rolls and subscriptions shall be terminated unless dues and subscriptions, respectively, are paid in full by February 20, of each year.

4. OFFICERS. The Officers of The Division shall be the Chairman, Vice-Chairman, Secretary, Sergeant-at-Arms, and Treasurer (although one person may hold the office of Secretary and Treasurer), whose duties shall be those ordinarily performed by such officials, and shall include the duties hereby delegated to the respective officials, and such duties as may from time to time be delegated to them.

The Executive Committee shall have the authority to fill any vacancy which may occur in any Office, including Directors.

The Secretary shall arrange the program for each meeting. Not less than ninety (90) days prior to each annual meeting, the Secretary shall mail to all Members of whatever class, an announcement of the time and place of the coming meeting.

The Treasurer shall deposit the funds of The Division only in banks and securities approved by the Executive Committee. The Treasurer shall be bonded for an amount determined from time to time by the Executive Committee.

5. EXECUTIVE COMMITTEE. There shall be an Executive Committee consisting of the Officers, the Editor of "Rubber Chemistry and Technology," the Advertising Manager of "Rubber Chemistry and Technology" and five (5) Directors. The duties of the Executive Committee shall be as herein provided and as hereafter determined by The Division from time to time, and they shall perform the duties and assume the responsibilities ordinarily associated with such a committee.

The Officers of The Division shall be the Officers of the Executive Committee.

Each Director shall have the privilege of nominating one alternate, who is a Member of The Division, to represent him throughout any meeting of the Executive Committee, subject to the approval of the Chairman.

The Executive Committee shall meet at least twice each year. Meetings shall be held at the time and place of The Division meetings except that the meetings of the Executive Committee shall precede the meetings of The Division.

Seven (7) members of the Executive Committee shall constitute a quorum.

6. ELECTIONS. All elections shall be by secret ballot. The Chairman shall not be eligible for election for the ensuing year.

Three of the five Directors shall be elected by The Division for a term of one year, starting at the close of the annual meeting at which the election is held. The out-going Chairman and the defeated nominee for Vice-Chairman receiving next to the largest number of votes for that office shall be Directors for the ensuing year. No Director shall be eligible for re-election as a Director for the ensuing year. Each Member shall vote for not more than three (3) nominees for Director. The three nominees for Director receiving the largest number of votes shall be declared elected. In the event of an indecisive vote because of a tie, those nominees receiving the same number of votes shall be voted upon until the tie is removed.

After receiving the Report of the Nominating Committee, the Chairman shall call for nominations, from the floor.

In the event The Division does not hold a fall meeting, or no quorum is present at such meeting, the Executive Committee shall provide for a mail ballot.

7. "RUBBER CHEMISTRY AND TECHNOLOGY." "Rubber Chemistry and Technology" (hereinafter referred to as "The Journal"), shall be published by The Division.

The Editor and Advertising Manager shall be appointed by the Chairman, subject to the approval of the elected Members of the Executive Committee. Any such action shall be effective for no longer than one year, and each shall serve until his succeessor is appointed.

The Editor shall publish The Journal from time to time during the year, in the name of The Division. He shall submit a budget for the following half of the calendar year to the Treasurer in writing, at least thirty (30) days before each regular meeting of the Executive Committee, and the Treasurer shall send copies of the same to each Member of said Committee before the meeting.

The Advertising Manager shall submit an estimate of the revenue to be expected during the following half of the calendar year to the Treasurer in writing at least thirty (30) days before each regular meeting of the Executive Committee, and the Treasurer shall send copies of the same to each Member of said Committee before the meeting.

The Editor and Advertising Manager shall absent themselves from Executive Committee meetings during discussions of the respective appointments of the Editor and Advertising Manager of The Journal.

The Division shall neither publish nor sponsor any other publication except on the approval of the Executive Committee and under the terms prescribed by them.

8. Budget. Ten days prior to each regular meeting of the Executive Committee, the Treasurer shall submit to each Member of the Committee, a proposed budget covering all contemplated expenditures for the following half of the calendar year.

The Executive Committee at each regular meeting shall adopt a budget for The Division for the following half of the calendar year.

The Treasurer shall pay out no funds of The Division in excess of said budget until ten (10) days after mailing notification to each member of the Executive Committee of the fact that the budget is to be exceeded, and no funds shall be paid in excess of the budget in the event that the Treasurer receives a written protest from three (3) members of the Executive Committee within ten (10) days of the date of said mailing, exclusive of Saturdays, Sundays, national holidays and the date of mailing.

9. Meetings. Regular meetings of The Division shall be held at the times and places specified by the National Society unless otherwise determined by the Executive Committee. The annual meeting of The Division shall be in the fall of the year.

Fifty (50) Members shall constitute a quorum for any business meeting of The Division except that no election shall be held unless one hundred (100) Members are present.

10. Appointed Committees. The Chairman shall appoint the following committees and such other committees as from time to time he may deem best. These committees shall report at the annual meeting of The Division unless otherwise provided.

A. *Nominating Committee.* A Nominating Committee of five (5) Members shall be appointed at least sixty (60) days prior to the annual meeting. This committee shall select at least one nominee for each office to be voted on at the coming meeting, and at least two nominees for Vice-Chairman.

B. *Auditing Committee.* An Auditing Committee of three (3) Members shall be appointed who shall make an annual audit of the books of The Division.

C. *Membership Committee.* A Membership Committee of at least fifteen (15) Members shall be appointed.

D. *Crude Rubber Committee.* A Crude Rubber Committee of at least five (5) Members shall be appointed to study problems relating to control and use of crude rubber and latex and problems related thereto.

E. *Nomenclature Committee.* A Nomenclature Committee of at least five (5) Members shall be appointed to consider and make recommendations to The Division relative to naming of materials, and terminology used by the Rubber Industry.

11. Planning Committee. The Planning Committee shall comprise the Chairman, the out-going Chairman, the Vice-Chairman, the Secretary and such Members as the Chairman shall appoint thereto. The Vice-Chairman shall be chairman of this committee.

The committee shall make recommendations for future meetings and programs, symposiums, special programs, etc., such as will increase the value of The Division to its Members, the American Chemical Society and the public. At any meeting of The Division the Committee may submit for adoption a plan for any future meeting.

12. Fiscal Year. The fiscal year of The Division shall end December 31.

13. Responsibility. The Division is not responsible for statements and opinions advanced by individuals in papers, or discussions before its meeting.

No contract or agreement is binding on The Division unless approved by the Executive Committee.

14. Amendments of By-Laws. These By-Laws shall be amended only by a two-thirds (2/3) vote of the Members present at any regular meeting of The Division on recommendation of the Executive Committee. Amendments may be proposed by any Member by submission in writing to the Secretary, and when so submitted the Secretary shall refer said amendment to the Executive Committee. The Executive Committee shall consider same and make recommendations to The Division at its next regular meeting.

Covered-Rubber Yarn Development

RAPIDLY increasing consumption of covered-rubber yarn is taken as a definite indication that this comparatively new textile material will become a staple in the trade by W. Arnold Schaller in an article on the subject in a recent issue of *Textile World*. Although certain types of covered-rubber yarn have been used for garters, suspenders and other narrow elastic fabrics for a number of years, it is only within recent years that development of wide knitted and woven fabrics has taken place. This development has been due to rapid improvement of the covering and to the manufacturing of finer yarn.

Several types of covered-rubber yarn are available. In general, they consist of cotton wrappings wound around a rubber core; however, spun rayon, spun silk, or wool can be used instead of cotton. The yarns are available in many sizes and in several different degrees of stretch and pull-back, and many new types are being developed almost constantly.

Certain standard shades of yarn, of which the coverings have been dyed prior to being combined with the rubber core, have been developed for the corset and brassiere trade. In some instances the rubber itself is colored, so as to eliminate contrast in shade when the yarn is stretched. The normal color of rubber-yarn cores is a dirty tan; therefore, if a fabric made of yarn with a dark-colored wrapping were stretched, the tan would grin through, giving a speckled appearance to the cloth.

It is safe to say that the largest amount of covered-rubber yarn is supplied with a natural cotton covering. Later, it is dyed the desired shade in the yarn form prior to weaving, or it is woven into cloth and then piece bleached and dyed. This permits a flexibility of shades, which, from the stylist's point of view, is more desirable.

Dyeing and finishing of cloth containing covered-rubber yarn have necessitated the development of entirely new methods. Operators are taught to run their machines quite differently for such fabric than for ordinary rigid fabrics. At the present time garment manufacturers all have different ideas as to the correct finish. This is conducive to quicker development of the highest quality; however, eventually certain methods and finishes will become standardized.

Restoration of Facial Defects By Means of Vulcanized Latex

Method of Molding Artificial Latex Parts for Temporary or Permanent Use Is Perfected by the Mayo Clinic of Rochester

VARIOUS materials have been used to reproduce such lost parts as the nose, ear, cheek and upper lip of the human face, lost largely by the inroads of disease or accident. Hard dental vulcanite has been perhaps the most widely used material in this work because it is light, strong, can be manipulated into any shape, and lasts almost indefinitely. Its major objection is the difficulty of obtaining a lifelike appearance, such as can be produced by the use of gelatin and other translucent materials.

Attracted by the possibilities inherent in prevulcanized latex for the production of temporary or permanent replacements, Dr. Arthur H. Bulbulian, Director of the Museum of Hygiene and Medicine at the Mayo Clinic, Rochester, Minnesota, has been conducting a number of experiments during the past few years, several with interesting and successful results. In the July 12th issue of the *Proceedings*, published by the Mayo Clinic, Dr. Bulbulian traced the steps involved in the reconstruction of a patient's nose, as follows:

The first step was to make an accurate cast of the area involved including a generous portion beyond the affected area and as far in the nasal passages as it is desirable to have the inner surface of the artificial nose extend. To make such a cast the nasal passages must be plugged with cotton and then covered over with vaseline. A quick-setting soluble type of plaster of paris is most suitable for this work because of the ease of separating the cast from the mold.

After the impression of the area has been obtained a hard dental cast is made from this impression. The cast is separated from the impression by simply boiling the two and the impression which was made from the soluble type of plaster will dissolve while the permanent cast will remain intact. This cast which is an accurate replica of the condition of the patient's face will become the lower half of the final two-piece mold into which the material for the artificial nose will be poured.

The next step is to build on this cast, in wax, a nose of the desired shape and proportion. This wax pattern must be shaped in such a way that it will harmonize with the contours of the face. The peripheral margins of it must present an outline that is least conspicuous to the eye. This can be done best by placing the wax pattern on the patient's face and examining it from various angles. If the patient is not available for these frequent trials, a full facial cast of his face will serve the purpose.

After the wax pattern has been built up to the desired form, it is transferred to the first hard dental plaster cast and fastened by its edge. The top half of the mold is made by pouring hard dental plaster over it. The two halves of the mold are separated by immersing the two in hot water for a few minutes, which will soften the wax pattern within and allow its ready removal from the cavity of the mold, provided a separating medium such as vaseline has been used between the two halves of the mold.

A hole must now be made through which the liquid rubber is to be poured. This is made on the lower half of the mold, and is ¼ inch (0.63 cm.) in diameter widening out to about 1 inch (2.5 cm.) in diameter to form a conical channel. The mold is allowed to dry in a drying oven and is ready for the pouring of the compound which must be prepared as follows:

From a fresh supply of prevulcanized latex make a stock solution, "A", as follows: To 200 c.c. of Vultex, add 3 gm. of pure zinc oxide which has been previously mixed into a homogeneous mass with 5 c.c. of distilled water, and mix the mass thoroughly. This stock solution A can be kept in a large-mouth bottle for several weeks; however, since the presence of zinc oxide in it causes it to gel in time, it is desirable to make the stock solution at frequent intervals or, preferably, as needed. The purpose of the zinc oxide is to make the rubber less translucent and to give the mass a foundation for the dye which is to be added from the stock solution B, made as follows: Dissolve 1 gm. of Congo red in 120 c.c. of distilled water.

Small quantities of this solution can be transferred into a bottle supplied with a medicine-dropper. Now add to 30 c.c. of stock solution A, one drop of stock solution B, mix thoroughly, and pour it into the mold. Place the mold in an electric oven regulated to 70° C. At the end of twenty-four to forty-eight hours, depending on the thickness, the resultant rubber will have a color and translucency similar to that of skin.

Variations from this basic formula can be made by varying the proportions of stock solutions A and B. A little experience will enable one to judge what will result in the most suitable color.

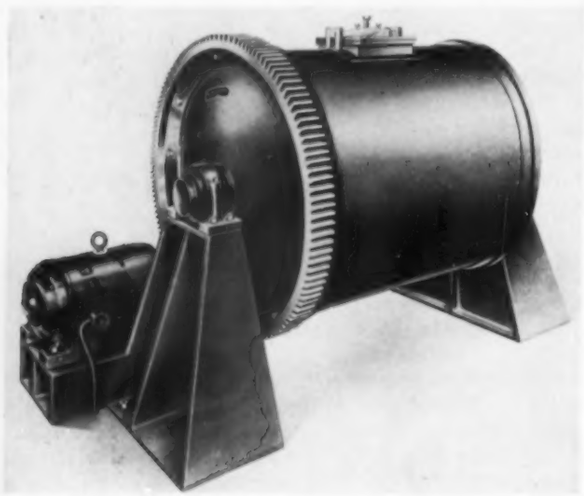
For a hollow appliance, the following method is used. Liquid rubber is poured into a mold which has been thoroughly dried, and warmed in an oven up to 70° C. In about thirty minutes, a solid mass of about 1/16 inch (0.16 cm.) in thickness adheres around the inner surface of the mold, while the center portion, still liquid, can be drained out forming a partially vulcanized hollow cast. When thoroughly vulcanized for twenty-four to forty-eight hours, the nostrils are cut out with a small pointed pair of scissors.

For adequate retention of artificial parts one must rely on three factors: (1) the anatomic configuration afforded by the remaining portion of the face; (2) mechanical support obtainable by the frame of spectacles; and (3) the use of small quantities of a liquid adhesive solution such as mastisol. In summarizing his work, Dr. Bulbulian stated that the ideal material for the production of artificial parts of the face and head has not yet been found, but that prevulcanized latex, properly compounded and manipulated, has a much wider range of possibilities as to form, color, texture and durability than any other material used to date.

New Equipment

Porter Ball and Pebble Mills

THE design and manufacture of a new line of ball and pebble mills, as well as other processing equipment including tube mills, agitators, mixers, blenders, autoclaves, kettles and tanks has been announced by the H. K. Porter Co. Inc., Pittsburgh, Penna. This company, known for more than 70 years as manufacturers of industrial and switching locomotives, recently



One of the new Porter ball mills

expanded its activities by the establishment of a separate division for the production of many types of processing equipment. Principal among the features found in the Porter ball and pebble mills are the following: All mills are mounted on self-aligning roller bearings of high load capacity designed to outlast the mill proper without attention other than lubrication. This reduction in friction load is said to materially reduce operating and maintenance cost. All mill stands are of electrically welded steel construction to support the loads and maintain rigidity. The motor stands are fabricated as an integral unit of the mill stand to avoid misalignment of motor drive. All drives are designed to meet the service required and have been selected for high overhung load capacity to minimize bearing wear in the drives themselves due to the spreading effect of gear and pinion loads. All unlined mills are constructed of high carbon steel with a manganese content of 1.50% to 2.00% and having a tensile strength of over 100,000 P.S.I. and a Brinell hardness of between 200 and 250. All mills, up to and including those 36 inches in diameter, are made with seamless formed dished heads of the same composition as the mill body. This feature is said to increase the ball action, reduce grinding time, and prevent corner wear. All jacketed mills, whether lined or unlined, have the jacket extending over nearly 100% of the mill surface instead of over a portion of the cylindrical surface; thus, more rapid cooling or heating is promoted, as may be required, and more rigid control of temperature is provided. Even distribution of heating and cooling media is obtained by means of baffles. All of the lined mills have standard doors which are said to be easily replaceable at low cost.

Improved Heinrich Vulcanizer

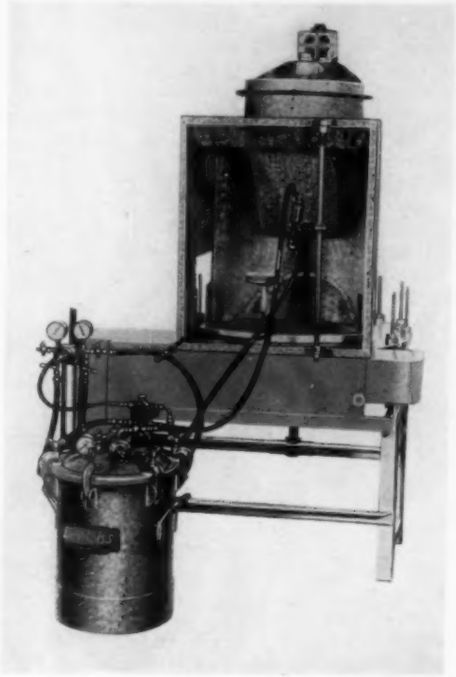
AN improved model of the Heinrich Electric-Hydraulic Vulcanizer, for rubber printing plates and other small hygienic rubber articles, has been made available by H. H. Heinrich, Inc., 200 Varick St., New York City. Comparison of this new model with previous attempts to produce efficient vulcanizers of this type should prove of interest. Although rubber printing plates made their appearance about half a century ago, they were used only intermittently because no vulcanizer was available which would insure precision plates having an even thickness over the entire plate within a tolerance of plus or minus .001. Cast iron vulcanizers were the first to make their appearance, and though they proved accurate when first installed they gradually lost their accuracy and therefore their value. When Heinrich engineers first began to develop a rubber printing plate vulcanizer they decided on an all-steel type using hermetically sealed, cartridge-type heating elements. The heat is controlled by means of a thermostat. By merely turning a knob on the ther-

mostat various degrees of heat are obtained, a result which cannot so readily be secured with steam vulcanizers. The steel construction of the Heinrich vulcanizer, according to its manufacturer, overcomes all previous difficulties as to tolerances and assures the production of perfect rubber plates, as well as rubber products where hygienic cleanliness is a necessity. It is also an ideal vulcanizer for laboratory use.

DeVilbiss Spray-Finishing Machine

ESPECIALLY designed for light duty work, a new rotary spray-finishing machine with a production range of 400 to 3,000 articles per hour has been announced by the DeVilbiss Company, Toledo, Ohio. The new machine lends itself to the coating of rubber balls and toys, and to the finishing of many types of hard rubber products, in addition to other industrial finishing applications. Installation of proper workholders permits finishing of a variety of different parts on the same machine. Speed reduction unit is standard to permit variable speed operation, and, if desired, a cam may be provided so that every second spindle only is sprayed. Length of spraying period per cam is ad-

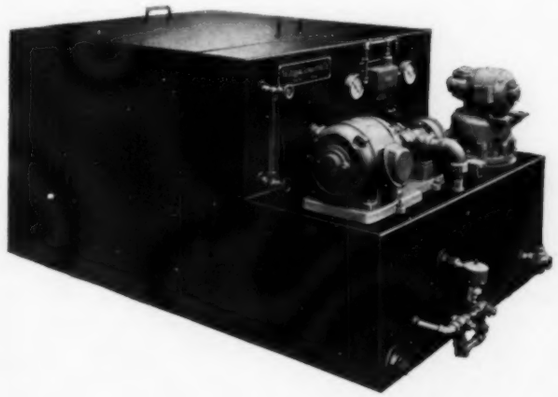
justable to the point of maximum efficiency and economy. Automatic spray gun and air control valve control the operation rigidly to the proper adjustment. A ¼ h.p. motor with synchronous speed of 1800 r.p.m. powers the unit. Turntable is 34¼ inches in diameter, and carries 15 spindles each of which rotates on ball



bearings. All pulleys, belts, sprockets, etc., are fully guarded for operator's protection. The new machine, known as Type YB-5103, is equipped with turntable, spindles, automatic spray gun and control valve, air transformer, material tank, exhaust fan, hose and hose connections. It is assembled at the plant and shipped direct.

Force Feed Lubrication System

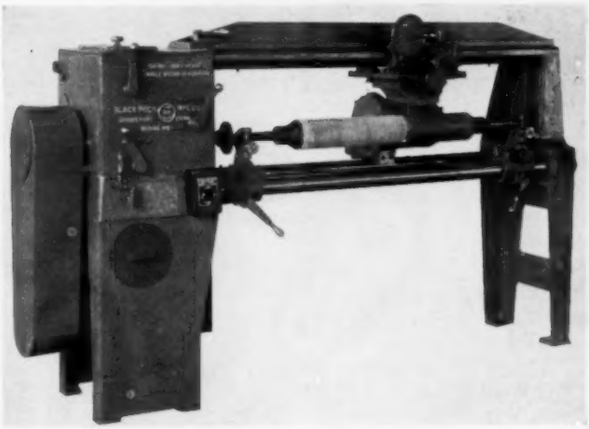
A COMPLETE new line of assembled unit pressure lubrication systems has been presented by the De Laval Separator Company, 165 Broadway, New York City, under the name of Unilube Systems, in sizes and types to meet varied lubrication requirements. For the



rubber industry a type is available for the lubrication of calender and mill roll neck bearings and drives. The new systems are compact, integral systems which furnish lubricant in streamline pressure supply to bearings or gear meshing points, and incorporate in a single unit automatic full feed pressure filtration and automatic temperature and pressure control of the lubricating supply. They are available in three types—single, double and dual—all of which are designed to handle any range of oil viscosities, including oils having a viscosity of approximately 2400 S.S.U. at 100° F. The capacity of each type ranges from 1 to 30 g.p.m. The Unilube is complete with baffles, level gauges, single dial thermometer and steam heating coil thermostatically controlled, pressure filter and pumps, all completely piped and mounted on a welded steel tank. The system is furnished completely assembled and ready for operation.

Grinding and Polishing Machine

THE 4-LM Machine designed for the production grinding of tubes from which washers are cut, wringer rolls, typewriter platens, printers' rollers, and other cylindrical rubber and composition articles, introduced by the Black Rock Manufacturing Co., Bridgeport, Conn., some time ago, has been improved so that it is now possible to grind and polish on the same machine. This has been accomplished by the addition of



Roller being ground on new Black Rock machine.

new high speeds, an optional auxiliary abrasive polishing pad, and improved automatic reversing mechanism for the carriage. The improved machine has many features which combine to make it almost universal in scope, including: infinitely variable work grinding and polishing speeds; six selective feeds for each grinding and polishing speed; indicating gauge for accurately setting up the work; means for grinding work on centers or journals; means for automatically obtaining one pass, two passes or repeated passes of the grinding wheel across the face of the work; easily operated, all controls being within reach of the operator; gear box automatically lubricated; liberal use of anti-friction bearings; heavy cast nickel iron carriage ways; and the ways and carriage are mounted above the work, insuring cleanliness and proper lubrication at all times. The accompanying illustration shows a left front view of the improved machine with a roller in position being ground.

An Index to Volume 45 of THE RUBBER AGE will be found in this issue facing page 66.

Booklets, Catalogs, etc.

Naugatuck Compounder's Manual. Naugatuck Chemical Division, U. S. Rubber Co., 1790 Broadway, New York City. 9 x 10¾ in. Looseleaf.

This manual, actually a binder containing a number of technical bulletins on various products sold by Naugatuck Chemical, inaugurates a new series of technical bulletins to be issued by the company. The bulletins give essential information on each of the company's many materials and products, with the limitations of the materials given as well as their advantages. The discussion and data presented in each bulletin are naturally intended only to illustrate uses and typical results which can be obtained with the specific material under discussion.

Included among bulletins contained in the "manual" at present are the following: *Trimene Base — Accelerator; O-X-A-F — Accelerator; Low Temperature Accelerators — Xanthates + Activator; B-J-F — Accelerator; Beutene — Accelerator; Monex — Accelerator; B-L-E Powder — Antioxidant; M-U-F — Antioxidant; Albasan — Antioxidant; E-S-E-N — Anti-Scorch.* Additional bulletins on other Naugatuck chemicals and compounding ingredients will be issued from time to time and may be inserted in the binder for filing.

The binder also includes a comprehensive price list. In addition to giving prices on both small and quantity lots of the various materials, the list also gives data on the physical state, specific gravity and principal uses of each product. The binder in its present form is a valuable manual for every rubber manufacturer to have, while the additional bulletins to be forwarded will continue to add to its value in addition to keeping it up-to-date at all times.

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Automobile Manufacturing. Automobile Manufacturers Association, 366 Madison Ave., New York City. 8½x11 in. 24 pp.

Based on a study by Andrew T. Court, noted economist, this booklet gives statistics and data which indicate that the use of labor saving machinery has made possible a current average standard of health, comfort and security for the individual worker which exceeds the highest humanitarian hopes of our forefathers. The achievement of these gains has sometimes involved a conflict of interests. Using the automobile industry as an outstanding example of the relationship between mechanization and employment, the booklet treats with the problems of how frictions can be minimized and how technological progress can be made to benefit, immediately and obviously, all concerned, including customers, employees and investors.

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"Latextile" Rubber Thread. William Warne & Co., Ltd., Barking, Essex, England. 7x9½ in. 20 pp.

Although primarily devoted to the advantages of "Latextile" Rubber Thread over other types of rubber thread, this booklet also sets out some of the problems with which the thread manufacturer has to contend and traces the strides which have been made in manufacture since scientific aids and control replaced rule-of-thumb methods. The manufacture of the company's square cut thread is described and illustrated step by step.

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Whitney Silent Chains and Sprockets. (Catalog V135). Whitney Chain & Mfg. Co., Hartford, Conn. 8½x11 in. 64 pp.

Complete information on the selection and design of silent chain drives is given in this catalog. Also included are engineering data, dimensions, horsepower ratings, and sprocket data, as well as illustrations of typical drives in various industries. List prices on the various chains and accessories are given.

Debts—Good or Bad? Public Affairs Committee, Inc., 30 Rockefeller Plaza, New York City. 5¼ x 8½ in. 32 pp. 10c.

Prepared by Maxwell S. Stewart, noted economist, on the basis of a study conducted by the Twentieth Century Fund's Committee on Debt Adjustment, this pamphlet, one of a series issued by the Public Affairs Committee, contains a warning against the deceptive ease of going into debt during a boom, such as occurred in the last world war. The author points out that as prices rise the debts created at a lower price level are easy to pay, and because they seem so easy to pay off people go further into debt without much thought, thus creating a problem for the future. As an example of the seriousness of this problem, the pamphlet reviews the havoc wrought by our rigid debt structure during the depths of the depression. In summarizing his conclusions, the author recommends that "the existing laws which force insurance companies, saving banks, and trustees, to invest almost entirely in debts be relaxed and perhaps eventually abolished." Other debt-favoring policies are similarly discouraged.

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Minerals Yearbook—1939. Published by Bureau of Mines, Department of the Interior, Washington, D. C. 6x9 in. 1,437 pp. $2.00 (from Superintendent of Documents, Washington, D. C.).

In addition to a complete official record of mineral production in the United States in 1938, this book reviews current trends in consumption, prices, stocks, technologic progress, world conditions, and international trade for approximately one hundred metal and mineral products. There is also a summarization of the domestic situation with respect to the more important strategic materials that must be obtained in whole or in large part from foreign sources. For the first time statistics on the sale of barite, by consuming industries, are included. The complete set of statistics given indicates that 1938 was a poor year for the minerals industry.

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Little-Known G.E. Products for Industry. General Electric Co., Schenectady, N. Y. 5¼ x 7¾ in. 16 pp.

This booklet contains a review of 28 of the special, unusual, and little-known products of General Electric. In addition to listing and illustrating these products, brief resumés of their nature, purposes and applications are given. Included in the list are a number of instruments or devices which although appearing to have laboratory uses only have also found profitable application to production routines. Other items are designed for assistance in engineering studies and investigations, while still others are intended for production testing on inspection. Some of the instruments with specialized applications include the recording spectrophotometer, magnetic analyzer, and Zahn viscosimeters.

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Don't Play With Fire. Walter Kidde & Co., Bloomfield, N. J. 8½x11 in. 8 pp.

This booklet describes the way in which carbon dioxide snow-and-gas smothers fires involving inflammable liquids and electrical equipment. The various types of "Lux" equipment made by the company for smothering fires of this kind are illustrated and described. Prominently featured is a new handy portable type model which has an overall height of only 16 inches and is equipped with a pistol trigger.

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Automatic Wire Bundling Machine. Gerrard Co., Inc., 2915 West 47th St., Chicago, Ill. 8½x11 in. 4 pp.

This four-page, two-colored folder is devoted to a description of the company's "Q" semi-automatic wire bundler which is capable of approximately 15 ties per minute and which is applicable equally to the tying of newspapers or the reinforcing of shipping containers holding rubber goods or other products. The versatility of the machine is stressed.

Davison's Textile Blue Book (74th Edition). Davison Publishing Co., Ridgewood, N. J. 6½x9 in. 1,400 pp. $7.50.

The latest edition of this complete annual register of the textile industry has been revised and brought up-to-date. As the result of cooperation with the Department of Commerce there is included a revised classification of cotton mills according to product manufactured in each mill. Of interest to chemical and dyestuff firms is a section showing all mills with dye houses. A classified directory of dyers and finishers is also given. In addition to the volume described, which is termed the Office Edition, there are two other editions available: the Handy Edition, which does not include the classified directory and buyer's guide, and which sells for $5.00 per copy, and the Salesmen's Directory, which lists mills only, at $4.00 per copy.

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Life, Service and Cost of Service of Pneumatic Tractor Tires. (Bulletin 382). By Eugene G. McKibben and J. Brownlee Davidson. Agricultural Experiment Station, Iowa State College of Agriculture and Mechanical Arts, Ames, Iowa. 5¾x8¾ in. 24 pp.

As indicated in the title, the life, service and cost of service of pneumatic tractor tires are discussed in this bulletin. The discussion is based on the experience of Iowa farm users of 199 sets of pneumatic tractor tires. This experience indicates satisfactory durability and field performance. Each factor is treated with separately and tables are used in several cases to show the advantages of using tires on tractors.

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Know Ohio—A Souvenir of the Buckeye State. Compiled by B. A. Aughinbaugh. Department of Education, State of Ohio, Columbus, Ohio. 6¾ x 10 in. 64 pp.

The history of Ohio, past and present, is ably presented in question and answer form in this interesting souvenir booklet. Typical questions are: Where does Ohio receive its name? Where was the first town in Ohio? Who was Johnny Appleseed? How do the counties rate in farm products? What are some world-famous Ohio concerns? An index helps the reader locate any question (and answer) in which he may be particularly interested. The booklet is amply illustrated.

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Automotive Brake Lining. National Bureau of Standards, Department of Commerce, Washington, D. C. 8 x 10½ in. 9 pp.

Issued as Letter Circular 556, this bulletin furnishes general information on automobile brakes and indicates the characteristics which brake linings should have in order that the brakes may operate safely, uniformly, and efficiently. Edited from the consumer angle, such subjects as types of brakes, adapting linings to brakes, coefficient of friction of brake linings, and wearing qualities of brake linings are discussed. Some consideration to the purchase of brake linings is also given.

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Automobile Facts and Figures—1939. Automobile Manufacturers Association, Inc., 366 Madison Ave., New York City. 6 x 9 in. 96 pp.

This is the twenty-first consecutive issue of the annual statistical review of the automobile industry in the United States and Canada. It reveals that factory sales in 1938 amounted to 2,655,171, that registration reached a total of 29,485,680 units, that $1,300,652,000 is invested in car and truck factories in the United States, and that motor vehicle owners paid $1,529,312,125 in taxes during the year.

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Storage and Mixing Equipment for Acids and Corrosive Chemicals. (Bulletin 404). U. S. Stoneware Co., 60 East 42nd St., New York City. 8½x11 in. 8 pp.

In addition to illustrating and describing the company's line of storage and mixing equipment, this catalog is virtually one of the most complete treatises available on the subject of acid-proof tanks, jars, pots and trays. The company's line of corrosion-resistant lining materials is also described.

The Wage and Hour Law. School of Law, Duke University, Durham, N. C. 7¼x10½ in. 170 pp. 75c.

Under the above title the summer issue of *Law and Contemporary Problems,* the quarterly journal issued by Duke University's School of Law, is devoted to a symposium on the subject of the Federal Wage and Hour Law. Questions concerning legal interpretation and the economic effect of the Act are fully discussed in 12 chapters. Separate articles are devoted to the child labor provisions of the Act and to the work of industry committees. Constitutional questions are handled by two imaginary Supreme Court opinions—one upholding, and the other attacking, the constitutionality of the law.

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Pennsylvania—Its Many Industrial Advantages. Department of Commerce, Commonwealth of Pennsylvania, Harrisburg, Penn. 8½x11 in. 24 pp.

The advantages of Pennsylvania as a state in which to locate manufacturing enterprises are stressed in this attractive booklet. The state's railroad system, highway system, seaports and inland waterways, air transportation facilities, electric power, and raw material centers are all treated with in the booklet. Numerous illustrations are used.

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Manhattan Rubber Products for Industry. (4th Edition). Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc., 94 Townsend St., Passaic, N. J. 8½x11½ in. 56 pp.

Hundreds of mechanical rubber products and special items manufactured by the company are described and illustrated in this new catalog. Particular emphasis is given belting, hose, packing, molded goods, rubber roll coverings, tank linings and abrasive wheels. The catalog also contains transmission belt engineering data and technical information on many other products.

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Sixty New Synthetic Waxes. Beacon Co., 89 Bickford St., Boston, Mass. 5½x8¼ in. 16 pp.

As indicated by the title, this booklet lists sixty new synthetic waxes, together with their characteristics and general suggested uses. Included are a number of waxes which find application in the rubber industry. In addition, a table showing the melting points and acid numbers of common natural waxes is included.

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Progressive Paterson. Paterson Industrial Commission, City Hall, Paterson N. J. 11x8 in. 16 pp.

The advantages of the City of Paterson as a place in which to work, live and play are cited in this booklet. Stress is laid on the fact that the city has a "friendly atmosphere to industry" and that it is a "great retail center." Other advantages for locating factories within the environs of the city are given.

Book Reviews

Uses of Lac. By H. K. Sen and S. Ranganathan. Published by the Indian Lac Research Institute, Namkum, Ranchi, Bihar, India. 4¾x7 in. 78 pp. Price: Re. 1/4/- (approximately 75 cents).

Largely a compilation of data published in technical and scientific books and journals in recent years, this book was written in answer to demands for information regarding the possibility of increasing the uses of lac and shellac in India. Particular attention is paid to present uses of shellac in electrical insulating materials, protective and decorative finishes, grinding wheels, the hat industry, gramophone records, and sealing wax manufacture. One section is devoted to recent miscellaneous applications. Some data on the manufacture of shellac is given.

Editorial Comment

Re-Exports of Rubber

HOW closely the Administration at Washington is watching trade activities so that no innocent-appearing deals reflect to the discredit of the United States in its current legislation with regard to European belligerents was indicated by President Roosevelt at his press conference of September 26 during which he declared that it would not be deemed a patriotic act if dealers importing such commodities as crude rubber, various grades of manganese ore, and chrome, continued to engage in the re-exporting of such commodities.

The President's statement was apparently based on the fact that re-exports of crude rubber, and other commodities, have increased substantially since the outbreak of hostilities abroad, not necessarily to belligerents but to nations which might possibly be engaged in conflict in the near future, judging from the current trend of events. Re-exports of crude rubber are generally unimportant, averaging approximately 400 tons a month. The exact amount of the increase since hostilities broke out in Europe is not yet known, although it is significant that the Rubber Manufacturers Association asked for details on re-exports for the first time in its last-issued regular monthly questionnaire.

In keeping with the President's remarks anent re-exports, the Rubber Trade Association of New York adopted a resolution on October 3 expressing disapproval of re-exports of rubber and requesting "the members of this association to forego business of this nature." The resolution, unanimously adopted by the Association's full directorate, is indicative of the desire of industry to cooperate with the Administration in maintaining the complete neutrality of the United States.

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Victory for Goodyear

THE decision of the Supreme Court on October 9th to refuse to review the decision of the Sixth Circuit Court of Appeals with respect to the Federal Trade Commission's suit against the Goodyear Tire & Rubber Company, with regard to that company's one-time contract with Sears, Roebuck & Company, is apparently the end of this six-year legal battle which involved volumes of testimony and tomes of evidence.

The Commission charged Goodyear with being discriminatory in its sale of tires to Sears-Roebuck. Shortly after passage of the Robinson-Patman Act, however, Goodyear voluntarily cancelled its contract with the mail order house. Based on this cancellation the circuit court declared the case "moot." The Commission appealed to the Supreme Court and the latter remanded the case to the circuit court for a decision on the issues.

After reviewing the issues, the circuit court handed down a ruling in favor of Goodyear and set aside the original "cease-and-desist" order issued by the Commission. This decision was again appealed to the Supreme Court which has now written "finis" to the case by refusing to review it. Although sympathizing with Goodyear in its defense of the original order, one cannot help but admire the tenacity of the Federal Trade Commission in this now-historic case.

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Increased Shipments

IF any further assurance was required as to whether the restriction scheme would be continued in the face of European events involving England, it was given by the International Rubber Regulation Committee on October 3 when it raised the rubber export quota rate for the fourth quarter of the year to 75% of basic quotas, thereby adding another 18,000 tons to the potential rubber supply during that quarter.

It is being argued that the additional increase was made to provide England with enough rubber to meet the terms of the Anglo-American barter agreement for the exchange of cotton for rubber. While there is of course some basis of fact for this claim (although a 10% increase announced in mid-September was supposed to provide enough rubber for this purpose), there is also the point that the Committee was taking into consideration the plea of American producers for bigger shipments to relieve a tightening stock situation. Despite European hostilities, there is no doubt that the restriction scheme will be continued!

CURRENT • NEWS of the Rubber Industry

OCTOBER, 1939

RUBBER EXPORT QUOTA 75% FOR 4TH QUARTER

Meeting in London on October 2, the International Rubber Regulation Committee announced a 5% increase in permissible exports of crude rubber from signatory countries for the fourth quarter of the year, bringing permissible shipments up to 75% of potential production. The increase was allowed in an attempt to alleviate the tight rubber supply situation in major consuming countries, particularly the United States.

The meeting and decision of the Committee to increase permissible shipments had special significance in that it was a definite indication that no complete suspension of the rubber restriction plan is contemplated now or in the early future despite the present European situation. This indication should serve to allay the fears of manufacturers in major consuming countries with respect to the future availability of rubber.

Previously Raised to 70%

At its previous meeting, held September 8, the Regulation Committee jumped the quota from 60 to 70% effective immediately. This move was made to provide sufficient rubber to enable England to carry out its end of the Anglo-American barter agreement for the exchange of cotton for rubber. It now develops that a 15% extension was in reality agreed upon when the first increase was announced, but, at the request of the British Government, only a 10% increase was put into effect for the balance of the third quarter of the year, and the additional 5% increase allowed only for the fourth quarter.

Permissible shipments from all producing countries in the agreement, with the exception of Thailand (Siam) and French Indo-China, will amount to approximately 91,000 tons monthly on the basis of an export quota of 75%. This is approximately 18,000 tons more per month than exports under the 60% quota originally set for the third and fourth quarters of the year and compares with shipments of 61,020 tons monthly from the same countries during the first half of the year when permissible shipments were fixed at 50% of basic quotas.

Monthly exports from all agreement territories, including Thailand and French Indo-China, will average 99,901 tons during the fourth quarter of the year, which will bring permissible shipments for all agreement countries for the entire year to 976,505 tons, or an average of 81,376 tons monthly.

Exports from Thailand are subject to the same percentages of basic quotas as other countries under the restriction agreement during 1939-43, but may not be reduced below a minimum of 41,000 tons annually. Exports from French Indo-China are not subject to restriction except that part of any exports in excess of 60,000 tons annually during 1939-43 is to be delivered to the Regulation Committee.

Crude Rubber Still Leads

Imports of crude rubber, including latex, into the United States in the six-month period ended June 30, 1939, were valued at $78,803,000, according to the Foreign Commerce Department of the Chamber of Commerce of the United States, Washington, D. C. This is an increase of 14.3% over the $68,935,000 imported in the corresponding period of the previous year. In the 1939 period, crude rubber led all imports as to value, accounting for 7.4% of total value of all imported materials.

M.I.T. Courses on Rubber

Two courses on rubber will be given by the Massachusetts Institute of Technology, Cambridge, Mass., during the present semester, one on "The Industrial Chemistry of Plastics" and the other on "Practical Compounding of Rubber." The plastics course, which will cover a number of other materials besides rubber, will be given by Warren K. Lewis, Professor of Chemical Engineering, and Charles E. Reed, Assistant Professor of Chemical Engineering. It starts on November 8 and consists of 16 lectures, the cost being $5.00 for each part of 8 lectures or $9.00 for the complete course. The rubber compounding course will be given by Morris Omansky, consulting chemist and rubber technologist. It will begin on November 7 and consist of 8 lectures, the entire cost being $5.00.

An Index to Volume 45 of THE RUBBER AGE will be found facing page 66 in this issue.

CREDIT STORE SALES SHOWED DROP IN 1938

Cash sales and time-payment sales of automobile tire and accessory stores showed decreases in 1938 as compared with the previous year, but these declines were largely offset by a slight gain in charge-account business, according to the recently-concluded annual retail credit survey conducted by the Marketing Research Division of the Bureau of Foreign & Domestic Commerce, Washington, D. C. Total sales of credit-granting automobile tire and accessory stores in 1938 were down 2.2 per cent from those in 1937.

More than two-thirds, or 68.7 per cent, of the 1938 sales of the reporting automobile tire and accessory stores were made on charge account, which was an advance from 66.4 per cent of total sales of the average store in 1937. These charge-account sales in 1938 actually increased 1.2 per cent from 1937, but cash sales were off 5.6 per cent last year and installment sales declined 13.1 per cent from 1937 to 1938. Sales on installment, or deferred payments, represented only 12.8 per cent of the total sales of the average automobile tire and accessory store in 1938, while cash sales were 18.5 per cent of total sales.

Charge-Account Losses Advanced

Charge-account losses of the automobile tire and accessory stores advanced slightly from an average of $1.06 per hundred dollars of charge-account sales in 1937 to $1.15 in 1938, reflecting the moderate decrease in the rate of collections. These losses were far in excess of the average losses for all retail trades which were 37 cents and 35 cents per hundred dollars of open-credit sales in the respective years. This situation is somewhat unusual in view of the fact that the time required for the collection of the typical automobile store account was considerably less than the average for all retailing.

A small sample of automobile tire and accessory stores reported extremely high installment losses averaging $3.58 on each hundred dollars of installment sales in 1937 and $4.39 in 1938, although this increase is not accounted for by a slowing down of collections which averaged about 29 per cent of balances outstanding at the first of the month during both years. This collection ratio indicates an average length of installment contract of 6 months for such products as tires, radios, batteries, etc.

A.S.T.M. APPROVES NEW TEST METHODS

At a meeting held at the headquarters of the American Society for Testing Materials in Philadelphia last month, the Society's Committee E-10 on Standards, which in the interval between annual meetings has the authority of approving proposed new tentative standards for publication or revisions of existing tentative standards or tentative revisions of existing standards, acted on a large number of recommendations from the standing committees on materials.

Many new important specifications cover materials on which the Society had not previously issued any standardized requirements, and while quite a number of the actions resulted from the desire of various committees to have their existing specifications and tests in the best possible shape for inclusion in the *1939 Book of A.S.T.M. Standards*, which will be available late in November, many of the actions or recommendations on new standards resulted from work under way during the past year or more.

Work under way for some time in the sub-committees of A.S.T.M. Committee D-11 on Rubber and Rubber Products culminated in two new recommended test methods providing standardized testing procedures which have been urgently needed. One of these involves testing sponge rubber products, the use of which has been greatly increased in the automotive industry and for upholstery by railroads and in other fields. The new methods (D-552—39 T) cover chemically blown sponge rubber, expanded cell-tight sponge rubber, and foamed latex sponge rubber.

Requirements of New Methods

Requirements cover sampling, standard test slabs, measurements of dimensions, and chemical and physical tests—the latter including accelerated aging, compression, compression set and indentation tests and flexing. The Committee felt that the method represented the best that can be obtained at present and should be published immediately to aid industry though it is recognized that development and improvement will continue.

The new tentative methods for testing rubber cements for total solid content and viscosity (D-553—39 T) will be a start in the standardization of tests of rubber cements. In spite of the large quantities of the material used industrially in the automotive and shoe industries, as well as elsewhere, there has been very little standardization in the past. Viscosity and solids content are important characteristics for specifying quality and should be determined in a standard manner to avoid argument.

Alternate methods are given for viscosity determinations. The first of these, known as the funnel method, gives closely duplicable results but is limited in use to those cements having viscosities which permit sufficiently rapid flow through the funnel to avoid excessive loss of solvent. The second, or falling cylinder method, is adapted to a wider range of cement viscosities and offers some advantages in control testing due to ease of manipulation.

Another item approved in the field of rubber involves an addition to the recent methods of testing hard rubber products (D-530—39 T), these methods having been approved at the June meeting of the Society. A portion covering the analysis of ash has been included since this is important because mineral fillers of rubber are thus determined. Certain other minor changes were approved covering essential precautions to assure accuracy.

Coming Events

Oct. 17-18. Rubber Section, National Safety Council, Auditorium, Atlantic City, N. J.

Oct. 20. New York Rubber Group, Building Trades Club, New York City.

Nov. 3. Akron Rubber Group, City Club, Akron, Ohio.

Nov. 3-4. Motion and Time Study Clinic, Auspices of Industrial Management Society, Medinah Club, Chicago.

Nov. 7. Los Angeles Rubber Group, Mayfair Hotel, Los Angeles, Calif.

Nov. 15-17. American Institute of Chemical Engineers, Providence-Biltmore Hotel, Providence, R. I.

Dec. 2. "Rubber Ball," Akron, Ohio.

Dec. 4-9. 17th Exposition of Chemical Industries, Grand Central Palace, N. Y. C.

April 8-12. Spring Meeting, American Chemical Society, Cincinnati, Ohio.

Binney & Smith Outing

Approximately 125 members of the New York office of the Binney & Smith Company attended an outing of the firm held on September 9 at Vanderbilt Field near Little Neck, Long Island, N. Y. Lunch was served at noon and the balance of the day was devoted to sports activities, including a soft ball game between single and married men. A dinner was served in the evening and prizes were given to the winners of the various events.

New Football Guide

The Gastex Football Guide for 1939, prepared by Grantland Rice, noted sports authority, is being distributed by the General Atlas Carbon Co., 60 Wall St., New York City. Like other editions issued by the company, the guide includes complete football schedules of 231 colleges and universities with previous year's scores. Copies may be had for the asking.

SEES NO CHANGE IN MARKETING SITUATION

War should make little change in the marketing of rubber products, according to a statement made last month by W. O'Neil, president of the General Tire & Rubber Company, Akron. America has never obtained very much business from either Germany or Russia, he said, principally because Germany has had no money and Russia has its own rubber manufacturing plants.

"Business with South America should be better," Mr. O'Neil stated, "not so much because its imports from some European countries have been cut off but because of the increased needs for the various forms of manufactured rubber." The General Tire executive continued:

"Revision of the neutrality act to provide for sales to belligerents on a cash-and-carry basis is the only sensible step for America to take. The present neutrality law should never have been put into effect for it is certainly discriminatory against nations that control the seas. And the rubber industry doesn't manufacture anything that's on the proscribed list.

"Business in the tire and rubber industry should be much better this fall. Instead of the seasonal slump that ordinarily comes in September and October, tire manufacturing operations generally have been holding up to the high levels reached during the late spring and summer months.

"Rubber is needed to transport freight and already there is a shortage of freight-carrying equipment. While manufacturing operations are bound to be increased, no plant expansions should be necessary as there is still sufficient unused plant capacity in the industry to provide for the expected greater demand. The rubber industry enjoyed as good a month in September as it has ever had in its history and there is no let-down in sight."

Issue Jubilee Edition

The October, 1939, issue of the *India Rubber World* is the Golden Anniversary edition of that journal. To commemorate the occasion the editorial content of the issue is given over to a number of articles tracing the progress made by various branches of the rubber industry since 1889. In addition, several pages from the initial issue are reproduced. The October issue also marks the adoption of a new format for the publication.

Mexico Making Own Tires

Tire manufacturers in Mexico, protected by tariffs and other governmental assistance, are now supplying more than 90% of the domestic requirements of that country, according to the Department of Commerce, Washington, D. C. Production in the first half of the current year was estimated to have reached 100,000 units.

FURTHER ASSURANCE ON RUBBER SUPPLIES

The outbreak of hostilities abroad early in September was immediately followed by a wide scramble on the part of rubber manufacturers in this country to purchase available supplies of crude rubber. In an attempt to halt this "mad" buying rush, the Rubber Manufacturers Association, on September 6, sent a telegram to every rubber manufacturer in the country the point of which was that supplies are adequate and there was no real basis for the "hysterical activity" in the commodity markets, as recorded in our previous issue. Since that time, the Association has released a special statement on the situation, which is being reproduced in full as follows:

"The Rubber Manufacturers Association, Inc., has been in touch with the American Government, which in turn, it is understood, has been in discussion with the British authorities as regards the prospective supplies of rubber. We now have reliable information that all of the rubber required in consuming countries can and will be supplied at reasonable prices throughout the war.

Sufficient Rubber on Hand

"It is pointed out that the production of rubber in all producing territories will go on unhindered by the European war. There is more than enough rubber available in these territories to supply all conceivable demand in war time and there is no indication whatever that the governments of the producing countries or the International Rubber Regulation Committee will have any interest in preventing, or any desire to prevent, this rubber from flowing to consuming markets as required.

"The willingness to act promptly in making adequate supplies available is evidenced by a provision for additional shipments in the fourth quarter to implement the exchange of cotton and rubber by the governments of the United Kingdom and the United States. Also, it is understood that the International Rubber Regulation Committee is giving most earnest consideration to the request of the manufacturing industry in the U. S. A. for an increase on the commercial quota in the fourth quarter. (This has been granted—EDITOR.)

"As for shipping, there is substantial evidence that adequate shipping is available and that it will continue to be provided regardless of adjustment of routes and lines. The U. S. Maritime Commission has expressed its willingness and its ability to give aid if necessary.

"After a careful canvass of all factors involved, it is clear that there is at present no basis for concern regarding rubber supplies for the United States, unless such concern is created by a speculative movement. It is, of course, true at the present time as at any time that competitive bidding for limited supplies immediately available would create an unwarranted price situation, harmful chiefly to manufacturers and other consumers themselves.

"This statement has been submitted to the Department of State in Washington which, while taking no responsibility for the views expressed therein, find them in accord with the information and advices which it has received from the officials of the British Government most directly concerned."

Monsanto To Hold Prices

The Monsanto Chemical Company informed its customers by letter on September 18 that with few exceptions its present selling prices yield a fair profit and it will not increase selling prices of its products even though there may be an opportunity to do so, unless there are sound reasons for such action, and that a review of the more important raw materials does not indicate any reason for a precipitous rise in their cost. The letter also expressed the belief that there is ample installed capacity for all the products the company manufactures to supply any normal domestic demand and a substantial share of export markets.

New Sun Rubber Plant?

According to reports from Fredericksburg, Ohio, the Sun Rubber Company, of Barberton, has taken an option on a plant in that town formerly occupied by a pottery. Several Sun Rubber executives are reported to have visited Fredericksburg recently.

FINAL SAFETY REPORT MADE BY RUBBER GROUP

The final report on the annual safety contest sponsored by the Rubber Section of the National Safety Council for the 1938-39 season shows that a total of 36 rubber plants were enrolled in the contest and that these plants worked 98,385,787 man-hours during the year. The average frequency rate for all contestants was 6.616, as compared with 10.079 in the 1937 period, although the latter rate was based on a six-month contest only.

The Gadsden, Alabama, and New Toronto, Canada, plants of Goodyear Tire & Rubber Co., and the Kitchener, Canada, plant of the Dominion Rubber Co., Ltd., finished in first, second and third place, respectively, in the contest for large plants working 125,001 man-hours or more per month. The three winners had frequency rates below 1.270. The average rates for all large plants was 6.775.

In the contest for small organizations averaging from 5,000 to 125,000 man-hours per month, both the Lobl Manufacturing Co., Middleboro, Mass., and the Fabric Fire Hose Co., Sandy Hook, Conn., winners of first and second place, respectively, established no-injury records for the contest year. The Montreal, Canada, factory of the Dominion Rubber Co., Ltd., finished in third place in this division with a frequency rate of only .794.

SCHOOL NEEDS DISPLAYED IN U.S. RUBBER WINDOW

Clothes and accessories for men, women and children, all using U.S. Rubber materials or made by that company, currently are displayed in the ground-floor windows of the U.S. Rubber Company's building at 58th Street and Broadway in New York City. In the display shown in the reproduction above are school needs for boys and young men including hats, raincoats, waterproof footwear, tennis and basketball shoes, pajamas, trunks, socks, shorts, golf balls and a variety of other essential and luxury items.

D. SCOTT, JR., HEADS RHODE ISLAND CLUB

Dave C. Scott, Jr., of the Henry L. Scott Company, Providence, R. I., was elected president, and John E. Marshall, Jr., of the Collyer Insulated Wire Company, Pawtucket, R. I., was elected secretary-treasurer, of the Rhode Island Rubber Club at the Fall Meeting of the Club held at the Wannamoisett Country Club in Rumford, R. I., on September 22.

The following were elected members of the Executive Committee: R. Edson (Anaconda Wire), A. J. Davis (Goodyear Footwear), F. P. Jecusco (U. S. Rubber), S. J. Lake (Respro), C. Berlow (American Wringer), L. K. Youse (Firestone), F. H. Springer (Davol Rubber), D. Rhee (Carr Mfg.), and F. S. Bartlett (U. S. Rubber).

The meeting, which was well attended, was preceded by the usual golf tournament, with William Fish winning top honors in the low gross class with an 80, closely followed by Harold Simmons with an 81. Honors in the low net went to K. C. Bevans, C. R. Mullins and Frank Donovan, while S. J. Lake, H. Ring and L. E. Dickenson were among the winners of the kicker's handicap. Prizes were awarded to all winners in the various events.

The speaker at the business session was Roger Oake, member of the French Department of Brown University, and well known as a radio commentator. Mr. Oake, who has traveled extensively and spent much time in Poland, talked on "The Eastern Front," and discussed the latest developments in European hostilities. At the conclusion of his talk, the speaker answered numerous questions.

Distribution of prizes was in the hands of A. J. Davis (Goodyear Footwear) and were made available by the following companies: Agar Mfg. Corp., American Zinc Sales Co., Robert Badenhop Corp., Baird Rubber & Trading Co., Stewart Bolling & Co., Binney & Smith, George L. Claflin, Farrel-Birmingham, Inc., Gair, Inc., General Atlas Carbon Co., Goodyear Footwear Corp., Industrial Paper Co., L. Littlejohn Co., Meyer & Brown, Inc., Naugatuck Chemical, Pequanoc Rubber Co., Respro, Inc., Titanium Pigment Corp., United Carbon Co., and Charles T. Wilson, Inc.

Akron Meets November 3

The Akron Group, Rubber Division, A.C.S., will hold its Fall meeting on Friday, November 3, at the Akron City Club. Dinner will be served promptly at 7.00 P. M. In addition to the showing of the Godfrey L. Cabot film "Inside the Flame," there will be a talk by Clair A. Dietrich. Mr. Dietrich sailed with Admiral Byrd to both the North and South poles and will tell of his experiences. Music will be furnished by the Co-Ed Orchestra. Tickets may be secured from T. L. Stevens, 2510 First Central Tower, Akron, secretary-treasurer of the Group.

Germany Confiscates Tires

According to newspaper advices from abroad the German Government has confiscated every privately-owned rubber tire in the Reich. The order, issued by the bureau in charge of rubber and asbestos, was issued in conjunction with a decree which virtually prohibited the private use of automobiles after September 20. Stocks of tires held by wholesalers and dealers were to have been turned over immediately to the Government, while tires in use by owners were to have been held until such time as the owners were notified to deliver them to officials.

To Auction Tire Equipment

All the machinery and equipment of the former National Tire & Rubber Corporation will be sold at public auction on Thursday, October 19, on the site of the company's factory in East Palestine, Ohio. The equipment includes calenders, mills, fabric dryers, tubers, refiners, vulcanizers, cement churns, etc. The sale will be under the management of the Industrial Plants Corporation, Ohio Building, Toledo, Ohio. National Tire & Rubber ceased operations several years ago. Its machinery and equipment was later purchased by M. Andre, of Paris, France, whose intention was to remove it to France. Due to prevailing conditions, however, such removal is not advisable and therefore the equipment will be sold at public auction as reported above.

N. Y. Group to Meet

The next meeting of the New York Group, Rubber Division, A.C.S., will be held on October 20th at the Building Trades Employers Club, 2 Park Avenue, New York City. The technical session will start promptly at 4:00 P.M. and cash prizes will be given to three winners of the Technical Paper Contest announced by the Group earlier this year. The three winning papers will be read. Dinner will be served at 6:30 P.M. and will be followed by some surprise entertainment. Tickets for the meeting are $2.00 and may be secured from B. Brittain Wilson, c/o *India Rubber World*, 420 Lexington Avenue, New York City, secretary-treasurer of the Group.

Discusses Overinflation

Continuing its series of bulletins on automobile passenger and truck tires, the Rubber Manufacturers Association has just issued one on "Overinflation of Truck Tires." The bulletin not only discusses the dangers of overinflation but contains a number of specific recommendations to avoid the dangers. Illustrations are liberally used to stress the points made in the bulletin.

NAVY LIFE FEATURES LOS ANGELES MEETING

The activities of three branches of the United States Navy were explained in talks and motion pictures at the first supper meeting of the new season held by the Los Angeles Group, Rubber Division, A.C.S., at the Mayfair Hotel in Los Angeles on October 3. The meeting, attended by approximately 75 members and guests, also featured the distribution of door prizes and a report by Leon Horchitz (Goodrich), known as the "Walter Winchell of the Group."

Three separate films were shown, the first, called "Navy Wings of Gold," showing details of training in the Naval Air Station at Pensacola, Florida; the second, "Service in Submarines," portraying the training of seamen for submarine work in the training school at New London, Conn.; and the third, "Crossroads of the Pacific," giving details of life aboard a battleship and tracing a recent cruise to Hawaii with maneuvers off the coast of that island.

Lieutenant-Commander J. R. McKinney of the United States Navy gave a short talk on the value of an adequate navy to a major power and then spoke at some length on the history of the United States Navy. He was assisted in the presentation of the three films by C. J. Farrell, a turret captain, and by H. A. Breen, a chief electrician's mate.

The door prize of the evening, a portable radio set donated by the W. C. Hardesty Company, was won by Dick Behrman (U.S. Rubber), while the special prize, a de luxe toaster and serving tray, donated by the American Turpentine and Tar Company, went to Frank Baglin (West American Rubber). Four prizes, each consisting of a half-dozen golf balls in an attractive case, offered in lieu of table favors, given by H. Muehlstein & Co., were won by Bill Holmes (Dill Mfg.), Bill Haney (Kirkhill Rubber), Bill Michalak (MacClatchie Mfg.), and J. Edward Tufft, Los Angeles correspondent of RUBBER AGE.

New Type Rubber Toys

A new type of rubber toy, based on a process developed by Jack Dawn, make-up expert of the Metro-Goldwyn-Mayer Studios, Hollywood, California, will soon make its appearance. The new toys will have a movable armature inside and latex outside. This permits them to be very flexible so that they can be moved to various positions and stay set and then moved back again when desired. They will be light in weight and no joints will be visible. Mr. Dawn is said to have discovered the process, which has been patented, while working on toys for the "Wizard of Oz" production. Various manufacturers will be licensed to manufacture toys using the new process shortly. Licensing arrangements are in the hands of the Mitchell J. Hamilburg Company, 6305 Yucca Street, Hollywood, California.

Names in the News

ERNEST BRIDGWATER, Manager, Rubber Chemicals Department, E. I. du Pont de Nemours & Co., Inc., is back at his desk in Wilmington, Delaware, fully recuperated from an emergency appendectomy performed in Bermuda at the end of a month's vacation he was spending on that island. Mr. Bridgwater arrived in New York on the *American Clipper* on September 19 and was met at the airplane base by a private ambulance which took him direct to Wilmington.

C. E. BRADLEY, JR., has joined the chemical research staff of the R. T. Vanderbilt Company at its Norwalk, Conn., laboratories. A graduate of Amherst, Mr. Bradley spent two years in post graduate work in chemistry at the University of Chicago, the last year of which he worked directly under Dr. Harkins.

WILLIS GLEED COE, production manager of RUBBER AGE, passed out the cigars last month, the occasion being birth of a son to MRS. COE. Both mother and son are reported doing nicely. The boy has been named JOHN GLEED COE.

F. A. SEIBERLING, founder of the Goodyear Tire & Rubber Company and later of the Seiberling Rubber Company, known as the "Dean of the Rubber Industry," celebrated his 80th birthday on October 6. He was honored by both a family dinner and an anniversary ball staged by his present employees in Akron.

PAUL J. MAYLE, controller, Dayton Rubber Manufacturing Co., Dayton, Ohio, led a discussion on "Budgets" at a meeting of the American Institute of Controllers, held in Dayton on October 12.

ERNEST I. KILCUP, president, Davol Rubber Co., Providence, R. I., was one of the principal speakers at the annual convention of the Federal Wholesale Druggists' Association, held at Hot Springs, Virginia, the week of September 18. His talk centered on the responsibility of the American business man in the control of taxes.

V. R. JACOBS, manager, aeronautical and government sales, Goodyear Tire & Rubber Co., Akron, acted as toastmaster at the annual dinner of the Automotive Engineers Society, held in Milwaukee, Wis., on September 28. It was the third successive year he had performed in the same capacity.

WESTERN WILES, sales manager, Faultless Rubber Co., Ashland, Ohio, was elected a member of the board of directors of that company at a meeting of the board held on September 30. He succeeded R. G. STOCKDALE.

COL. HARLOW D. SAVAGE, vice-president, Baker & Spencer, Inc., engineers of New York City, was elected executive vice-president of the Universal Plastics Corporation of New Brunswick, N. J., last month. He will devote his full time to his new connection and will maintain headquarters in New Brunswick. Universal Plastics makes rubber serving trays in addition to a varied line of plastic products.

HARVEY WILLSON, one-time assistant general manager of the Rubber Manufacturers Association, and formerly publisher of *Tire Topics*, has joined the Knickerbocker Employment Agency in New York City as general contact and placement executive.

E. L. ANTONEN, secretary-treasurer, Denman Tire & Rubber Co., Warren, Ohio, addressed the Cleveland (Ohio) Chapter of the National Association of Cost Accountants at a dinner meeting held at the Mid-Day Club in Cleveland on September 21. He spoke on "Fundamentals of Standard Costs."

JOHN J. NOBLE, who has been associated with the Vulcanized Rubber Company, of New York City and Morrisville, Penna., for the past 26 years, was named vice-president and sales manager of that concern last month. PRESCOTT BEACH, who joined the company 6 years ago, has been named secretary and assistant sales manager.

A. C. HORROCKS, associated with the public relations department of the Goodyear Tire & Rubber Co., Akron, was elected president of the National Association of Foremen last month during the Association's convention in Pittsburgh. H. G. EVANS, also of Goodyear, was elected secretary.

GEORGE B. DRYDEN, president, Dryden Rubber Co., Chicago, Ill., was recently tendered a dinner on the occasion of his birthday by "Room 301," a group of Chicago Athletic Association members. A souvenir booklet depicting Mr. Dryden's life in poetry and sketches was distributed at the dinner.

Union Officers Reelected

Sherman H. Dalrymple, Thomas F. Burns and Frank Grillo were reelected president, vice-president and secretary-treasurer, respectively, of the United Rubber Workers of America at the fourth annual convention of the union held at La Crosse, Wisconsin, the week of September 11. The executive board of the union was enlarged.

John Lyon Collyer

who arrives in this country this month to take over the reins of the B. F. Goodrich Company. Mr. Collyer, formerly joint managing director of the Dunlop Rubber Co., Ltd., in England, was elected president of the Goodrich organization last month to succeed S. B. Robertson.

Polish Plant Destroyed

According to a cable received by the General Tire & Rubber Company in Akron from Emil Schnedarek, the tire plant operated by Stomil, Inc., at Poznan, Poland, under supervision of General Tire engineers, was recently destroyed by Polish troops to prevent its falling into German hands, while a newly-built tire plant at Debica had fallen into possession of the German troops. Both Mr. Schnedarek and Harry Conroy, who had been acting as chief of the technical staff at the Poznan factory, as well as J. Petrowski, managing director of Stomil, Inc., escaped to Rumania. The first two were later reported at Copenhagen and are expected back in this country shortly.

Transportation Meeting Set

Tires, two-speed axles, multi-speed transmission, automotive maintenance, engine wear, and selection of color for trucks and buses are headline topics for the National Transportation Meeting of the Society of Automotive Engineers, which will be held at the Hotel Coronado in St. Louis, Mo., on October 26 and 27. Scheduled for presentation is a paper on "New Life in Fleet Tires," by L. W. Fox and A. L. MacCracken, of the Firestone Tire & Rubber and Goodyear Tire & Rubber companies, respectively.

Los Angeles News

The Golden State Rubber Mills, Inc., 651 East 61st Street, in a recent modernization project has more than doubled its factory area as well as its office space. The exterior and interior of the building have been refinished, half of the building formerly occupied by another concern being taken over. A. S. Rocklen, vice president and secretary, states that three new salesmen have been added in the East and Middle West covering areas not previously covered. Considerable new machinery, including several new presses, has been added to the equipment. The expansion followed a visit here of I. D. Blumenthal, president of the company, who has his headquarters at Charlotte, N. C.

W. J. Voit, president of the W. J. Voit Rubber Corporation, is home in Los Angeles from a four month tour around the world. Mr. Voit visited four different continents and reports that he got home without encountering serious inconvenience from disturbed conditions abroad.

Members of the Los Angeles Rubber Group have received word from E. O. ("Twisty") Malmquist, formerly connected with the production department of Goodyear in Los Angeles, now manager of Technical Service for the same company in Stockholm, Sweden. Mr. Malmquist describes inconveniences due to war conditions on the continent of Europe, such as curtailing gasoline consumption and conserving of food.

The Sierra Rubber Company has added a few new presses in order to keep up with an increasing demand for its products.

The recreational set-up at Goodrich will be revived with the coming of cool weather. The first activity has been in bowling, eight teams having been lined up for weekly practice representing various departments. A basket-ball schedule will also be worked out soon as well as other competitive activities.

The U. S. Rubber Company hopes to have the large warehouse for finished products now under construction ready for use early in December. The factory is now running seven days per week and 24 hours a day. An active recreational program is planned for the winter with twelve bowling teams in play beginning a weekly schedule on October 16.

Alvin J. Slay, purchasing agent for Goodyear in its Australian plant, visited the Los Angeles plant this month en route to Akron. Mr. Slay will return to Australia in the fall. Prior to his transfer to Australia in 1926, Mr. Slay spent seven and one half years in the Los Angeles plant as assistant purchasing agent.

It was announced at the October meeting of the Los Angeles Rubber Group that the chairman of the Group, Garvin A. Drew, Pacific Coast sales manager for A. Schrader's Son, is being transferred to the main offices of the company in Brooklyn, N. Y. Mr. Drew has lived in Los Angeles for several years and has been especially active in the group's activities.

Mechanical Prices Rise

Following the lead set by the Goodyear Tire & Rubber Co. and the B. F. Goodrich Co., both the U. S. Rubber Co. and the Republic Rubber Division of Lee Rubber & Tire Corp. announced increases on their respective lines of mechanical rubber goods last month. Exact increases were not specified by either company, but both referred to the uncertainty of commodity markets. Increases ranging from 5 to 10% in the export prices of tires and tubes have been announced by domestic tire manufacturers to compensate for higher manufacturing costs due to the rise in crude rubber quotations, new foreign exchange rates, and higher shipping charges.

Plan Manchukuan Factory

The Yokohama Rubber Company, of Tokyo, Japan, has decided to establish a branch plant in Manchukuo, according to report, with the consent and cooperation of the Manchukuo Government. The company claims to have developed a new process for the manufacture of tire cord, but no details are as yet available. Yokohama Rubber was originally established as a subsidiary of the B. F. Goodrich Company, but control shifted to the Japanese Furukawa in 1935.

Faultless Rubber Co.

Year ended June 30, 1939: Net profit of $70,324, equal to $1.07 each on 65,450 shares of no-par capital stock, against $15,329, or 23 cents a share, in the previous year. Current assets as of June 30, 1939, amounted to $781,906, including $244,673 in cash, against current liabilities of $93,436. According to T. W. Miller, chairman of the company, an increase in earned surplus gave the common stock a book value of $23.89.

Rename General Plastics

The name of General Plastics, Inc., manufacturers of "Durez" phenolic molding compounds and resins, including several which find application in the rubber industry for bonding rubber to metal, has been changed to Durez Plastics & Chemicals, Inc. The company maintains headquarters at North Tonawanda, N. Y.

1939 TIRE SALES SET AT 50,000,000 UNITS

Tire sales this year will reach the 50,000,000 unit mark, representing a gain of fully 20% over the 1938 sales total of 42,330,000 tires, according to an estimate made in an article in a recent issue of the *Journal of Commerce*. The estimate was said to reflect the record replacement tire business during the current year to date and the anticipated high rate of automobile production during the last quarter of the year.

According to classifications, the article stated, replacement sales for the year are now estimated at 33,000,000 to 34,000,000 tires. New equipment business is calculated at approximately 16,000,000 tires. Exports, it is estimated, should be in the neighborhood of 1,000,000 tires. In 1938 replacement sales amounted to 30,560,000 tires, while original equipment sales reached a total of only 10,700,000.

These estimates are based on the assumption that no sharp wave of inventory buying will develop in the tire industry over the next few months in anticipation of an increase in tire prices. Thus far only scattered forward buying has made its appearance, it is stated. Moreover, tire manufacturers are trying to forestall attempts of large users of tires to stock up at present prices.

Price Situation in Doubt

Just what will happen to tire prices this season when the new price lists are issued about November 1 still is anybody's guess. Some trade observers feel that list prices will be raised only moderately. There is little doubt, however, that the period of price shading witnessed this summer is definitely a thing of the past.

The firming of actual prices witnessed during the past few weeks amounts to a moderate increase in prices, it is stressed, although the fact remains that list prices still are based on 16-cent rubber.

The period of price-cutting witnessed during this summer was not due to any weakness in the statistical position of the industry, it is said, but rather to attempts of individual concerns to maintain their share of the total business. That led to increased competition during the peak season for replacement sales.

Barring a sudden spurt in inventory buying, it is not believed likely that replacement sales during the final months of the year will equal last year's rate for the corresponding months. During the last four months of 1938 replacement sales were in the neighborhood of 10,700,000 tires. This was far in excess of the replacement sales during the corresponding periods of 1936 and 1937, which were 9,500,000 and 8,700,000 tires, respectively.

An Index to Volume 45 of THE RUBBER AGE will be found facing page 66 in this issue.

RUBBER IN PRINTING STRESSED AT EXHIBIT

The extent to which rubber has supplemented the early Gutenberg woodcut and the more modern metal plates and type in commercial printing of many kinds since the last exposition in 1927

The rubber printing plate seen above was made from one of many Goodrich compounds.

was found in the exhibits of H. H. Heinrich, Inc., the American Type Founders Sales Co., and the American Evatype Corporation at the Fifth Graphic Arts Exposition, held at the Grand Central Palace, in New York City, from September 25 to October 7. All three companies displayed compact vulcanizers used to mold the new rubber plates. The equipment shown was naturally the latest type available.

Citing figures compiled by the B. F. Goodrich Company, which has developed 40 natural rubber and 15 synthetic printing compounds for specialized high-speed jobs, it was declared at the exposition that almost 90% of the nation's printing on corrugated boxes is now done with rubber plates or hand-engraved rubber type. It was also estimated that a large percentage of the imprinting of cellophane food and merchandise packaging is done with rubber, while increasing use is being made of the new medium in printing holiday wrapping paper, greeting cards, and burlap, fabric and paper bagging, in addition to other applications.

By the newest methods, which were demonstrated at the booths of the three suppliers of vulcanizers mentioned above, rubber type work, tint blocks, line cuts and plates for business forms are molded from Bakelite matrices in which a special phenolic resinoid has been incorporated. Steam or electric hydraulic precision vulcanizers, thermostatically controlled, are used to mold and vulcanize the plates, a method which enables control of plate making and printing under one roof and effects economies where plate demands are heavy.

Rubber's position in the printing industry was also in evidence at the booths of Sam'l Bingham's Son Mfg. Co., the Dayton Rubber Manufacturing Co., and the Rapid Roller Company. These three concerns exhibited their varied lines of rubber and synthetic rubber rollers which are used in letterpress, offset, intaglio and other forms of printing. Attendants at the three exhibits stated that the trend in the printing industry was definitely toward the use of synthetic rubber rollers because of their better ability to withstand oil and grease.

Latex Fiber Industries, Inc., of Beaver Falls, N. Y., was another exhibitor at the exposition, displaying numerous samples of "Lexide," its trade name for the artificial leather in which cellulose fibers are imbedded in rubber.

BUREAU FOR RUBBER SET UP IN THE HAGUE

In accordance with the official control recently assumed by the Netherlands Government over various industries in that country, a special Bureau for Rubber has been established at Bezuidenhoutscheweg 30, The Hague, which is the same address as that for the Ministry of Economic Affairs. As explained by the Leather and Rubber Division of the Bureau of Foreign & Domestic Commerce in Washington, D. C., the "rubber" implied in the decree setting up official control includes crude rubber, latex, rubber compounds, reclaimed rubber and "unvulcanized rubber."

The regulations now covering the rubber industry in the Netherlands are said to be of a broader character than those applying to practically all other industries. Not only are rubber manufacturers obliged to register with the new Bureau for Rubber, but dealers and agents of rubber and rubber products are likewise so obliged. Compounding of rubber will henceforth be subject to license by the Bureau, with the official decree providing for the immediate issuance of licenses to firms manufacturing rubber products for military purposes.

The order also contains a provision to the effect that the sale or transportation of rubber products is also subject to license. This provision will not apply to electrical conduits for a period to be stipulated by the director of the Bureau for Rubber, but sales to military authorities fall under the restriction at once. In order to cover expenses accrued by the Bureau the order states that licenses may be subject to a fee which may be stipulated at a later date.

To Make Koroseal Articles

The Warren-Featherbone Company, Three Oaks, Michigan, has been licensed by Comprehensive Fabrics, Inc., of New York City, to manufacture a line of sanitary goods of Koroseal-treated material. The line will include baby pants, bibs, aprons, dress shields, shower caps, and other articles designed for the notion department of retail stores.

GOODYEAR TIRE WINS SEARS-ROEBUCK CASE

The six-year legal battle between the Goodyear Tire & Rubber Company and the Federal Trade Commission, over the latter's charges of "discrimination" and issuance of a "cease-and-desist" order against the tire company, which involved Goodyear's contract with Sears, Roebuck & Company, was finally settled for all time by the refusal of the Supreme Court at Washington, D. C., on October 9th, to review the decision of the Sixth Circuit of Appeals, which had rendered a decision in Goodyear's favor and had set aside the Commission's original order.

Since Goodyear voluntarily cancelled its contract with Sears-Roebuck shortly after the passage of the Robinson-Patman Act, the case was being pressed more for the answers to the legal questions raised than for observance of the F.T.C.'s order to cease-and-desist. After Goodyear had cancelled the contract, the Sixth Circuit Court of Appeals declared the case "moot," but on an order from the Supreme Court was compelled to decide the case solely on the issues involved. Reviewing these issues, the court finally decided that Goodyear had not been discriminatory in favor of Sears-Roebuck.

New England

The waterproof and fabric shoe mills of the United States Rubber Company at Naugatuck, Conn., started operations on October 2 on a reduced schedule, working four days a week instead of five as heretofore. Walter H. Norton, factory manager, stated there would be no work on Mondays during October. Transfers of employees from the waterproof to the fabric shoe departments were being made ahead of schedule to avoid lay-offs.

Mr. Norton said that finished goods in the warehouse are sufficient to take care of anticipated business and that "there have been no indications of any volume of export orders." Price lists were withdrawn as of September 30 because of market fluctuations.

Local 45 of the United Rubber Workers of America, with headquarters in Naugatuck, Conn., voted in September to join with other locals of rubber workers to ask for a 10% wage increase. Negotiations have been started by officers of the international union with the executives of various companies.

Plans have been completed for an addition to the factory of the Armstrong Rubber Company in West Haven, Conn. The addition will be four stories high, 100 x 180 feet, of reinforced concrete construction.

SCIENTIFIC GRADING ADVOCATED BY FRENCH

The French rubber manufacturing industry has always held foremost rank in the production of certain medical and surgical applications of rubber. During the nineteenth century wild rubber era, however, the international influence of the French waned and the manufacturing industry held its own with difficulty.

Recently, with large-scale production from its Indo-China plantations, France has again become an important international factor, wielding increasing commercial as well as scientific influence. Exports from Indo-China, where the first plantation was begun in 1898, amounted to only 214 tons in 1913, and only 10,000 tons in 1930, but in 1938 exports passed 59,000 tons, 6.6% of total world output in that year.

Consumption Equals Production

With plantation output in Indo-China approximately equal to consumption in France, the nation occupies a unique position. Despite large consumption of rubber in England and the British Empire, it is pointed out by the Leather and Rubber Division of the Bureau of Foreign & Domestic Commerce, Washington, D. C., British interests lean heavily to the production side of the industry, the same as with the Netherlands.

France found a means of subsidizing plantations in Indo-China through an import duty on rubber entering the country, enabling the French crude rubber industry to weather the depression of 1930-33 with minimum hardships, and, incidentally, placing the country in a strategic position to gain valuable concessions under the original and revised International Rubber Regulation Agreements.

The approximate equality of French interest in production and consumption, plus the fact that a large percentage of the rubber produced in Indo-China actually goes to France for consumption, makes possible an unusual rapprochement between leading French producers and manufacturers, results of which are currently reflected in discussions and propaganda for a different and more accurate classification of grades of rubber based primarily on intrinsic characteristics of the material, instead of the present trade classifications which are based largely on its external appearance. Articles prepared by prominent rubber technologists have already appeared in the French technical press urging that present trade classifications be abandoned and replaced by standard tests.

No "Native" Rubber Problem

The development of a grading system based on scientific tests capable of quick and general application would probably be more easily possible for the French than for any other nation. Production in Indo-China is largely controlled by a limited number of very large companies, with practically no "native" rubber growing industry to present problems.

General abandonment of present grades and classification, of course, and adoption of any new system, can only come about by general trade agreement, according to the Leather and Rubber Division. Cleanliness of the material, and its color and appearance, remain considerations of importance. It is however not impossible that in the course of a few years a new and improved method for trade classification and grading of "estate" rubber at least may come into being. The Crude Rubber Committee of the Rubber Division, A.C.S., authored a preliminary specification of this nature in 1935.

Two New Antiseptics

Two new antiseptics, said to be non-toxic, non-irritating and odorless, have been introduced by Givaudan-Delawanna, Inc., 80 Fifth Avenue, New York City, under the names of Compound G-4 and Compound G-11. Both new compounds are in the form of white crystals and are said to be effective in concentrations of 0.5 to 1.5%, depending on the nature of the stock. They are straight chemical compounds of about the same toxicity as thymol and tests indicate that they have no deleterious effects on rubber compounds. Compound G-4 is said to be three times as powerful as thymol and Compound G-11 six times as powerful.

Bata Plant for Chile

The Czechoslovakian firm of Bata, known in this country as the Bata Shoe Company, will manufacture a varied line of rubber products in its recently completed factory in Chile, according to terms of an agreement which was recently reported to the U. S. Department of Commerce. Bata originally intended to manufacture shoes only in the Chile plant but after it had shipped the necessary machinery this project was stopped by the objection of national shoe manufacturers in the country. Bata then changed its plans to embrace the manufacture of rubber footwear, rubberized cloth, belting, packing and other rubber products.

Plan Second Rubber Ball

Akron's second "Ruber Ball" will be held in that city on Saturday evening, December 2, according to Mrs. Harris Waite, president of the Women's Art League, sponsors of the annual event. It is hoped to make the entire day of December 2 a "Rubber Day," with city-wide observances in which the entire population may participate. The committee in charge of the ball, headed by Mrs. Wilbur Pearce, has opened headquarters in Room 703 in the First Central Tower Building.

Obituaries

William A. Means

William A. Means, associated with the B. F. Goodrich Company in various executive capacities from 1897 until his retirement in 1930, died at his home, 421 Woodland Avenue, in Akron, Ohio, on October 6, following a prolonged illness, at the age of 72. He was associated with Goodrich in the days of the late Frank H. Mason, B. G. Work, P. W. Leavitt, A. J. Mills and C. C. Goodrich.

Born in 1867 in Radnor Township, Peoria County, Illinois, Mr. Means came to Akron with his family while still a youngster and was educated in the Akron public schools, being graduated from the old Akron High School in 1883. After a three-year period spent in Florida, he returned to Akron and entered the employ of Aultman, Miller & Company, serving as stock clerk, bookkeeper and paymaster.

In 1897 Mr. Means joined the Goodrich organization in the treasurer's department. Two years later he was elected assistant treasurer and in 1910 became treasurer. In March, 1917, he was named second vice-president of Goodrich and three years later became first vice-president. From 1911 until 1930 he acted as a director. Although he became inactive in 1925 because of poor health, he continued five more years as a director.

In addition to his official duties with Goodrich, Mr. Means figured prominently in the civic history of Akron. For 15 years he served as trustee of the Akron Sinking Fund Commission, 10 of which were spent as president. He helped form the First Industrial Bank of Akron and acted as one of its directors for many years. He was also a member of the Akron lodge, chapter, council and commandery of the Masonic Order and a member of Tadmor Temple.

Funeral services were held at his residence on October 8, with interment in Rose Hill Cemetery in Akron. Mr. Means leaves a widow.

Henry A. Van Dyck

Henry A. Van Dyck, who retired in 1935 as assistant controller of the United States Rubber Company, died on September 27 in Mary Imogene Bassett Hospital, Cooperstown, N. Y., after an illness of four months. He was 71 years of age. Mr. Van Dyck was an accountant and had worked at various times for the Albany *Argus*, the New York *Times*, and the Carnegie Trust Company, in addition to U. S. Rubber.

New Rubber Goods

All-Vision Facepiece

New wide vision, greater comfort, and added efficiency are advantages claimed for a new facepiece for gas masks developed by the Mine Safety Appliances Company, Pittsburgh, Pa. Made of soft molded rubber, the new facepiece, which has been termed the All-Vision Facepiece, has been adopted

as standard for all of the company's lines of gas masks. The size and shape of the lenses of the new facepiece is such that the wearer's vision is unrestricted without having extra glass surface to pick up reflections or add unnecessary weight. The dead air space has been reduced, thereby cutting down rebreathing of exhaled air which reduces fatigue and decreases the tendency to fog the lenses. The incoming air stream is directed over the entire area of the lens by means of a new type of deflector built integral with the facepiece, thereby preventing fogging. Using rubber has resulted in a facepiece that will follow the contour of the face, with minimum tension of headbands, and the elimination of "pressure points" that cause headaches and fatigue.

U. S. "Sand Special"

A new tire, known as the U. S. Royal "Sand Special," designed for use where sandy conditions exist, has been introduced by the U. S. Tire Dealers Corp., New York City. Originally designed to meet specific requirements for trucks and trailers operating in the Arabian oil fields, the new tire is said to meet the demands for large section tires suitable for operation at low inflation pressure on small trucks at bathing beaches and in sandy country, and is reported to be an ideal tire for the equipment used in launching coast guard life boats. The outside ribs of the new tire are formed in blocks with connecting links. The inside ribs are of the bramble type with pointed projections and corresponding indentations in the side of the ribs. Of seven-rib tread design, the "Sand Special" is available in 9.00-13 and 9.00-15 sizes.

Pinocchio Balloons

A line of balloons and inflatable toys featuring Pinocchio, the fairy tale character soon to be brought to life in the motion pictures by Walt Disney, has been introduced by the Oak Rubber Company, Ravenna, Ohio. Included in the balloon line is a toss-up balloon, a Pinocchio head with a long nose, and a Pinocchio panel print. The inflatable toys are made in two sizes,

one 10¾ inches high and one 18 inches high. A removable stopper in the foot of these inflatable toys makes it easy to blow up or deflate them. They are constructed of heavy-weight, pure white rubber, decorated in blue and red.

"Airflight" Bicycle Tire

Designed to meet the increasing demand for a tire and tube to fit the popular lightweight bicycles, the Fisk Tire Company, Chicopee Falls, Mass., has introduced a 26 x 1¼ straight side "Airflight." Lighter in weight and nearly an inch narrower in cross section, the new tire is said to be specially suitable for "stripped" bicycles, the type which is rapidly gaining in popularity both in this country and abroad. A feature of the tire is a corrugated sidewall running around one side of the tire for generator purposes, the generator supplying current for headlights. It has a specially designed rib tread to hold the road and despite its light weight it is said to be of sturdy construction.

Goodyear YKL Truck Tire

Described as a perfectly balanced, cooler-running, longer-wearing, streamlined unit, a new YKL truck tire has been introduced by the Goodyear Tire & Rubber Co., Akron, Ohio. Designed to meet conditions where high

speed, heat and bruising are major factors in shortening tire life, the new tire is made of Rayotwist cord, spun from rayon. Tread contact is 12½% greater because design is flatter. Center traction and double shoulders are important points in the construction of the tire. Also of interest to truckers is the tire's multiple compounding, a factor which is said to provide better distribution in the stresses between body and tread, thus preventing tread separation and insuring greater resilience to repeated blows of the highway at fast speeds. The new YKL tire is available in all balloon and high pressure sizes.

Non-Flood Battery Device

B. F. Goodrich Co., Akron, has developed a non-flood device for automobile storage batteries to meet problems created by the modern practice of putting the battery under the hood. Three hard rubber parts, a barrel with two air vents, vent cap and specially designed cell cover, make up the assembly of the new device. In operation, the barrel moves up when the vent cap is unscrewed and at the same time the two air vents located on each side of the barrel are closed, trapping air within the cell. As water is added, the air is forced to the top of the cell and when the electrolyte's level reaches the bottom of the barrel, the air pocket beneath the cell cover prevents further addition of water. At this point, a small amount of water collects in the barrel, indicating that the safe filling level has been reached, with the non-flood device assuring sufficient space within the cell for the electrolyte to expand.

Shower Stall Floor

A new shower stall floor, consisting of a slip-proof rubber shower floor combined with a water-proof asphalt receptor, which may be used with any shower

wall material, has been developed by the Patent Products Co., 2301 Hyde Park Boulevard, Los Angeles, Calif. Made of specially compounded rubber, the slip-proof rubber floor is safe to stand on, is warm, odorless and pleasant to use. The shower stall walls fit inside the walls of the new receptor so that it will catch any leakage through the shower walls higher up. This feature makes installation easy since perfect accuracy of the stall construction is not necessary.

Rubber Flashlight Case

A flashlight in a solid rubber case, which is both waterproof and shock-proof, was recently introduced by the Sterling Manufacturing Co., Ltd., 116, Piccadilly, London, W. 1, England. It has no lens to break and no external switch. The battery is held in position by shock absorbing springs which protect the bulb from percussion breakage. The flashlight can be used under water and, being completely insulated by the rubber case, it is particularly suitable for use when working on electrical switchgear. A quarter turn of the screwed cap at one end switches the lamp on or off, and there is a cavity in the cap for a spare bulb. By removing the cap completely the battery can be inserted or extracted.

Rubber Foot Cushion

A new detachable shoe cushion of felt and rubber has been developed by the Ace-Hy Products Company, 202 West 40th Street, New York City. Known as Tyr-No-More Shoe Pads, these cushions fit over the shoe and are fastened on the sole by a soft metal clamp which can easily be adjusted to allow for different sizes and shapes of shoes. They provide a shock-absorbing pad which the company recommends for dentists, factory workers, clerks, court attendants, office workers, and others.

Firestone Racing Set

The growing importance of the soap box derbies which have been held annually in the past few years is indicated by an announcement by the Firestone Tire & Rubber Co., Akron, Ohio, that it has developed and introduced a new axle-wheel-and-tire racing set for use on miniature racing cars which participate in the American Soap Box Derby. The new set, which is attractively packaged, has been approved by the Technical Committee of the National Soap Box Derby, Inc. The set contains solid narrow tires which are circular molded into seamless units. A clincher-type wheel rim construction eliminates the heavy wire binding that had been used previously to hold the rubber tread together. The steel wheel is equipped with ball bearings, and the axle is so constructed so as to preclude bending of the wheels or axles. Reduction of frontal area by use of a narrow wheel and tire is said to lessen wind resistance, an important factor in racing the miniature cars.

Juva-Tex Automatic Compact

A revolutionary type of compact for milady has made its appearance under the name of the Juva-Tex Automatic Compact. Made by Charles E. Zimmerman, 225 North Wabash Avenue, Chicago, Illinois, the compact is made

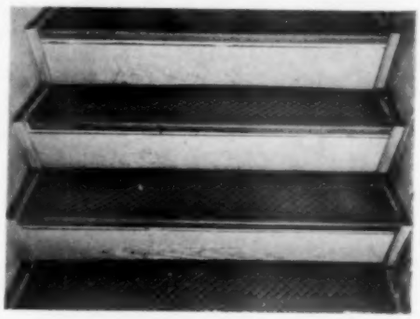
of Airfoam, the latex foam rubber developed by Goodyear. Powder is placed in the compact through a slit provided for the purpose. When used, the compact is simply tapped against the hand until the powder sifts through the rubber and then applied to the face. When not in use, the minute-like cells which compose Airfoam close automatically so that no powder is wasted or needlessly spilled. The company is also featuring a bath compact following the same principle of construction.

Cavalon Rubberized Fabric

A new type of Cavalon rubberized fabric for use on furniture has been announced by the Fabrikoid Division of E. I. du Pont de Nemours & Co., Inc., Empire State Building, New York City. Cavalon was originally designed as a leather-like upholstery for heavy duty trucks, but recent research has transformed the material into one suitable for furniture.

Melflex Safety Treads

The Melflex Products Co., 222 Merriman Road, Akron, Ohio, are supplying specially molded heavy-duty safety treads to the bus, coach and trans-



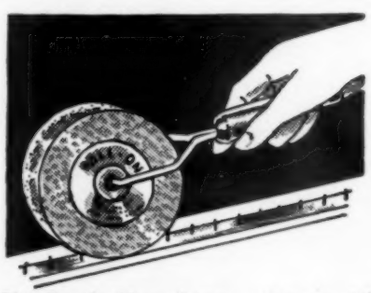
portation industry. These treads, of rubberized fabric construction, have met with approval by leading operators of transportation equipment throughout the country because they never become slippery at the approach edge, the real danger point on such equipment, according to the company. Melflex step treads are said to have unusually high frictional resistance and to eliminate the troublesome and dangerous slip hazard, thereby reducing accident claim payments.

Airfoam Eraser

The Jefferson Sales Company, Kingsport, Tenn., has introduced the Airfoam Eraser. The new eraser is comprised of a 2-inch by 4-inch piece of Airfoam, one-half inch thick, mounted on a backing of stiff rubber flooring material 3/16ths of an inch thick. Airfoam is the whipped latex material developed by the Goodyear Tire & Rubber Co., Akron, while the flooring material used to back the eraser is also of Goodyear make.

Roll-On Curtain Pinner

A clever device, made of durable rubber, which rolls curtains smoothly and evenly on to curtain stretcher pins, is the Hostess Roll-On Curtain Pinner just recently introduced by the Chicago Curtain Stretcher Company,



3701 South May Street, Chicago, Ill. The new device is said to make curtain stretching easy, and is quick and safe to use. No laborious hand-pinning and no pricked fingers are two major advantages of the rubber curtain pinner.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, OCTOBER 10, 1939

Crude Rubber

FROM a price of 24.00 for spot rubber on the Commodity Exchange on September 12 the quotation dropped steadily from day to day until it touched 19.25 on October 7, low for the period. The largest drop occurred on September 13, from 24.00 on the previous day to 22.75, due to release of August statistics by the Rubber Manufacturers Association, which showed that a sharp acceleration had taken place in the rate of shipments to this country. This served to still further allay the fears of those who were concerned with the tight stock situation which has existed in this country for the past few months. The growing feeling that deliveries from producing countries will continue unhampered despite the European hostilities led to a withdrawal of factory interests from the market, and this factor, probably above all others, was the principal one behind the steadily declining price. Announcement of a 75% quota for the fourth quarter of the year by the International Rubber Regulation Committee also served to keep prices in line despite increasing activity in rubber manufacturing circles and announcements of higher prices for mechanical rubber goods. Quotations in the outside market, Exchange, London and Singapore, follow:

As of October 10

Plantations—

Ribbed Smoked Sheets—

No. 1 Spot	—	@	.20½
January-March	—	@	.19
April-June	—	@	.18¾
No. 2	—	@	.19⅞
No. 3	—	@	.19⅝
No. 4	—	@	.19½
Thin Latex Crepe	—	@	.21¾
Thick Latex Crepe	—	@	.21¾
Brown Crepe, No. 1	—	@	.19⅞
Brown Crepe, No. 2	—	@	.19⅝
Amber Crepe, No. 2	—	@	.19⅞
Amber Crepe, No. 3	—	@	.19⅝
Brown Crepe, Rolled	—	@	.17¼

Latex—

Normal, per lb., carload lots	—	@	.24

Paras—

Up-River, fine	—	@	—
Acre Bolivian, fine	.17¼	@	.17½

Balata—

Surinam sheet	—	@	.38

LONDON MARKET

Standard Smoked Sheets—Sellers—October 10

January-March	9 1/32d	@	9 3/32d
April-June	9 1/32d	@	10 1/16d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—October 10

January-March	—	@	9 5/32d
April-June	—	@	8 31/32d

Reclaimed Rubber

The demand for reclaim took a sharp jump last month from practically all branches of the rubber industry. Prices have increased on several grades, particularly on tire and tube stocks, since our last report, the biggest increase being reported on white tire reclaim. Continued demand is expected for the coming month. Current quotations follow:

Shoe

Unwashed	lb.	.06½	@	.06¾
Washed	lb.	.10	@	.10¼

Tube

No. 2 (Compounded)	lb.	.09	@	.10
Red tube	lb.	.09	@	.09¼

Tires

Black (acid process)	lb.	.07	@	.07¼
Black, selected tires	lb.	.06	@	.06¼
Dark Gray	lb.	.09¼	@	.10
White	lb.	.12½	@	.14
Truck, Heavy Gravity	lb.	.05½	@	.06
Truck, Light Gravity	lb.	.07	@	.07½

Miscellaneous

Mechanical blends	lb.	.04½	@	.05

Scrap Rubber

(Delivered Akron Mills)

Scrap rubber dealers report continued demand from foreign sources as well as from domestic purchasers. Due to a tightening up of the stock situation, prices have increased on practically all grades of scrap since our last report. Still higher prices are foreseen. Current quotations follow:

(Prices to Consumers)

Auto tire peelings	ton	25.00	@	27.50
Mixed auto	ton	13.50	@	15.00
Beadless tires	ton	15.50	@	17.00
Clean solid truck tires	ton	27.50	@	30.00
Boots and shoes	ton	18.50	@	20.00
Arctics, untrimmed	ton	13.00	@	15.00
Inner tubes, No. 1	lb.	.08	@	.09
Inner tubes, No. 2	lb.	.04⅜	@	.04⅝
Inner tubes, Red	lb.	.04½	@	.04¾

Cotton

Cotton prices have been quite erratic since our last report. After jumping from 9.35 for middling uplands on the Exchange on September 9 to 9.64 on September 11, the following trading day, due to moderate Wall Street buying on the strength in stocks plus good support from the mills, the price started a downward trend until it touched 9.05, low for the period, on September 19. Weakness in foreign exchange and outside markets and the placing of an unfavorable interpretation on European war news were largely responsible for the decline. After September 19 the price swung in a narrow range until the last day of the month when announcement of increased exports, supported by bullish tendencies induced by war news from abroad, resulted in an advance to 9.39. Hedging operations in the first week of October again broke the price, touching 9.09 on October 9. Prices firmed up a little today, October 10, spot advancing to 9.14. The cotton crop is now estimated at 11,928,000 bales. Quotations for middling uplands on the Exchange follow:

	Sept. 9	October 10		
	Close	High	Low	Close
October	9.13	9.12	9.03	9.12
December	9.09	8.88	8.75	8.82
March	9.02	8.69	8.57	8.65

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.28¼	@	—
Peeler, carded, 23/4/3	lb.	.29¼	@	—
Peeler, carded, 15/3/3	lb.	.26¼	@	—
Peeler, carded, 15/4/2	lb.	.26¼	@	—
Peeler, carded, 13/3/3	lb.	.25¼	@	—
Egyptian, carded, 23/5/3	lb.	.42	@	—

CHAFERS

Carded, American, 1 1/16"	lb.	.28½	@	.29
Carded, American, 1"	lb.	.21¾	@	.28

Sheetings

48x40	36 in.	5.50	lb.	—	@ .04⅞
40x40	36 in.	6.15	lb.	—	@ .04⅜
40x36	36 in.	6.50	lb.	—	@ .04¼
48x48	40 in.	2.50	lb.	—	@ .09⅜
48x48	40 in.	2.85	lb.	—	@ .08⅜
56x60	40 in.	3.60	lb.	—	@ .07¾
48x44	40 in.	3.75	lb.	—	@ .06⅞

Ducks

Enameling (single filling)	lb.	.25	@	.27
Belting and Hose	lb.	.30	@	—
Single filling, A grade	lb.	.11½	@	.12½
Double filling	lb.	.12½	@	.13½

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

SEPTEMBER 11 TO OCTOBER 10

Date	Spot.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Sales
Sept. 11	23.75	23.40	21.87	21.77	21.65	21.00	20.84	20.68	20.67	20.65	20.65	20.65	20.65	——	291
12	24.00	23.20	22.85	22.17	21.50	20.85	20.50	20.14	20.12	20.08	19.90	19.70	19.70	——	320
13	22.75	22.00	21.60	21.25	20.90	20.15	19.81	19.48	19.41	19.35	19.30	19.25	19.25	——	213
14	22.75	22.15	21.60	21.20	20.80	20.05	19.73	19.45	19.40	19.32	19.27	19.22	19.22	——	346
15	22.25	22.25	21.50	21.06	20.62	19.90	19.60	19.30	19.25	19.20	19.15	19.10	19.10	——	115
16	22.25	21.80	21.00	20.80	20.60	19.90	19.60	19.30	19.20	19.10	19.05	19.00	19.00	——	128
17															
18	21.75	21.85	21.00	20.60	20.15	19.60	19.30	19.01	18.90	18.80	18.75	18.70	18.70	——	198
19	22.00	21.70	20.90	20.60	20.21	19.50	19.28	19.05	18.97	18.90	18.85	18.80	18.80	——	308
20	21.75	21.50	20.70	20.45	20.20	19.50	19.26	19.02	18.95	18.88	18.83	18.78	18.78	——	225
21	21.75	21.40	20.60	20.42	20.25	19.65	19.49	19.30	19.27	19.20	19.15	19.10	19.10	——	197
22	22.00	21.30	20.70	20.50	20.30	19.80	19.59	19.43	19.34	19.25	19.20	19.15	19.15	——	162
23	21.90	21.50	20.80	20.50	20.20	19.65	19.42	19.18	19.10	19.02	18.97	18.92	18.92	——	41
24															
25	21.00	20.75	20.00	19.62	19.25	18.85	18.70	18.55	18.47	18.40	18.40	18.40	18.40	——	166
26	20.70	20.05	19.90	19.67	19.40	19.05	18.90	18.75	18.65	18.55	18.55	18.55	18.55	——	207
27	20.25	——	19.90	19.72	19.55	19.05	18.91	18.75	18.72	18.65	18.65	18.65	18.65	——	107
28	20.20	——	19.90	19.78	19.66	19.15	18.98	18.82	18.73	18.65	18.65	18.65	18.65	——	152
29	20.00	——	19.80	19.58	19.36	18.90	18.70	18.50	18.37	18.25	18.25	18.25	18.25	——	123
30	20.10	——	19.90	19.77	19.65	19.10	18.89	18.60	18.56	18.50	18.50	18.50	18.50	——	72
Oct. 1															
2	20.25	——	20.00	19.75	19.70	18.90	18.71	18.51	18.42	18.38	18.35	18.35	18.35	18.35	97
3	19.95	——	19.45	19.40	19.35	18.25	18.09	17.90	17.76	17.61	17.58	17.55	17.55	17.55	169
4	19.50	——	19.15	19.07	19.00	18.05	17.90	17.75	17.62	17.50	17.50	17.50	17.50	17.50	225
5	19.65	——	19.30	19.22	19.15	18.25	18.10	17.95	17.85	17.75	17.75	17.75	17.75	17.75	73
6	19.60	——	19.29	19.17	19.03	18.35	18.23	18.10	18.02	17.95	17.92	17.90	17.90	17.90	219
7	19.25	——	18.96	18.84	18.69	18.20	17.97	17.75	17.67	17.60	17.58	17.56	17.55	17.55	134
8															
9	19.30	——	18.85	18.80	18.74	18.20	18.00	17.85	17.79	17.73	17.71	17.69	17.68	17.68	41
10	19.40	——	19.25	19.18	19.12	18.43	18.23	18.03	17.96	17.90	17.90	17.90	17.90	17.90	102

New York
October 11, 1939

Rubber CHEMICAL Markets

All Quotations F.O.B. Works Unless Noted

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.24 @	.30
A-10	lb.	.31 @	.35
A-11	lb.	.52 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.70 @	.80
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.55 @	.65
Butyl Zimate	lb.	2.50 @	—
Captax	lb.	.50 @	.60
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.45
El-Sixty	lb.	.50 @	.65
Ethyl Zimate	lb.	2.50 @	—
Ethylidene aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.37½ @	.42
Guantal	lb.	.40 @	.50
Heptene	lb.	.35 @	.40
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.14 @	—
Witco		.15 @	—
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.36 @	.37
Monex	lb.	— @	2.35
Oxynone	lb.	.64 @	.80
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	2.50 @	—
Pipsolene	lb.	1.55 @	1.85
R & H 40	lb.	.40 @	.41
R & H 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	2.50 @	2.75
R-23	lb.	.40 @	—
RN-2	lb.	1.40 @	1.80
RN-2 Crystals	lb.	2.00 @	2.25
Rotax	lb.	.60 @	.65
Safex	lb.	1.25 @	1.30
SPDX	lb.	.70 @	.75
Super-Sulphur No. 1	lb.	.50 @	—
No. 2	lb.	.18 @	.20
Thiocarbanilid, drums	lb.	.24 @	.30
Trimene	lb.	.55 @	.65
base	lb.	1.05 @	1.20
Triphenylguanidine	lb.	.45 @	—
Tuads	lb.	2.35 @	—
Ulto	lb.	1.50 @	1.75
Ureka	lb.	.60 @	.75
Ureka Blend B	lb.	.60 @	.75
Ureka C	lb.	.56 @	.65
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Zimate	lb.	2.35 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Compounding Materials)

Blues			
Prussian	lb.	.36 @	.37
Ultramarine	lb.	.15 @	—
Browns			
Mapico	lb.	.13 @	—
Umber, Turkey	lb	.04 @	.04½
Greens			
Chrome	lb.	.21 @	—
Chromium Oxide, bbl.	lb.	.21 @	—
Guignet's Green	lb.	.°0 @	—
Reds			
Antimony crimson, 15/17	lb.	.45 @	—
sulfur, free	lb.	.48 @	.60
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone, No. 19	lb.	.05¼ @	.05½
Cryptone CB, No. 21	lb.	.05¼ @	.05½
Cryptone, ZS-230	lb.	.07½ @	.07¾
Cryptone, ZS-86	lb.	.07½ @	.07¾
Lithopone			
Albalith, black label—11	lb.	.03¾ @	.04
Azolith	lb.	.03¾ @	.04
Ray-bar	lb.	.05⅝ @	.06⅛
Ray-cal	lb.	.05⅝ @	.06⅛
Rayox	lb.	.14 @	.17
Titanox A	lb.	.13 @	.13¾
Titanox B	lb.	.05¼ @	.05½
Titanox C	lb.	.05¼ @	.05½
Zinc Oxide—American Process			
American Azo: ZZZ (lead free)	lb.	.06¼ @	.06½
Anaconda, lead free	lb.	.06¼ @	.06½
Horsehead Lead Free Brand:			
Special—3	lb.	.06¼ @	.06½
XX Red—4	lb.	.06¼ @	.06½
XX Red—72	lb.	.06¼ @	.06½
XX Red—78	lb.	.06¼ @	.06½
XX Red—103	lb.	.06¼ @	.06½
Kadox, black label—15	lb.	.06½ @	.06¾
Blue label—16	lb.	.06½ @	.06¾
Red label—17	lb.	.06½ @	.06¾
St. Joe, black label	lb.	.06¼ @	.06½
green label	lb.	.06¼ @	.06½
red label	lb.	.06¼ @	.06½
U. S. P.—7. bbls	lb.	.09½ @	.09¾
Zinc Oxide—French Process			
Florence White seal—7 bbls.	lb.	.08¾ @	.08¾
Green seal—8	lb.	.08 @	.08¼
Red seal—9	lb.	.07½ @	.07¾
Yellows			
Cadmolith	lb.	.55 @	.65
Chrome	lb.	.14½ @	.15½
Mapico	lb.	.09½ @	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.0275 @	.0625
Bone, powdered	lb.	.05½ @	.14
Carbon, compressed	lb.	.0275 @	.0625
uncompressed	lb.	.0275 @	.0625
"Certified"	lb.	— @	—
"Spherons"	lb.	— @	—
"Disperso"	lb.	.0275 @	.0625
"Excello," compressed	lb.	.0275 @	.0625
"Fumonex"	lb.	.03 @	.05
"Gastex"	lb.	.03 @	.05
Lampblack	lb.	.07 @	.12
"Micronex"	lb.	.0275 @	.0625
"Supreme"	lb.	.0275 @	.0625
Thermatomic—"P 33"	lb.	.04¾ @	.07¾
"Thermax"	lb.	.01¾ @	.05
United "Dixie" & "Kosmos"	lb.	.0275 @	.0625

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85 @	24.50
Ammonia carbonate, lump	lb.	.10½ @	.12
Asbestine	ton	13.00 @	15.00
Barium carbonate (98-100%)	ton	— @	—
Barium Dust	lb.	.05 @	.06
Barytes	ton	23.65 @	31.15
Bentonite	lb.	.02 @	.03
Blanc fixe dry f.o.b. works	ton	60.00 @	65.00
Calcene	ton	37.50 @	45.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.40 @	60.00
heavy	ton	45.00 @	55.00
Clay, Kaolin, domestic	ton	7.50 @	15.00
Aerfloted, Suprex	ton	9.50 @	21.00
Congaree	ton	9.50 @	—
Crown (f.o.b. plant)	ton	9.50 @	—
Dixie	ton	11.00 @	26.00
Dixie, Jr.	ton	9.50 @	24.00
McNamee	ton	9.50 @	22.00
Par	ton	9.50 @	22.00
Witco	ton	9.50 @	—
Cotton Flock (Dark)	lb.	.10½ @	.13
Glues, extra white	lb.	.28 @	.30
medium white	lb.	.14 @	.19
Kalite No. 1	ton	24.00 @	50.00
Kalite No. 3	ton	34.00 @	60.00
"Lime Crest" Industrial Filler No. 100	lb.	— @	—
Magnesium carbonate	lb.	.07½ @	—
Mica	ton	35.00 @	44.00
Pyrax A	ton	6.00 @	20.00
Rottenstone (powdered)	lb.	.02½ @	.05
Soapstone, powdered	ton	16.00 @	22.00
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	25.00 @	45.00
Whiting, commercial	ton	17.00 @	18.00
Columbia Filler	ton	9.00 @	14.00
English Cliffstone	ton	33.00 @	43.00
Witco	ton	6.00 @	—
Wood Flour	ton	20.00 @	25.00
Zinc Carbonate	lb.	— @	.10¾
Zinc Stearate	lb.	.23 @	—

MINERAL RUBBER

285°-300° Mineral Rubber	ton	22.00 @	42.00
Black Diamond	ton	27.00 @	—
Genasco, solid (factory)	ton	25.00 @	27.00
Hard Hydrocarbon	ton	22.00 @	42.00
Parmr, solid	ton	25.00 @	—
Pioneer, MR. solid	ton		
Pioneer-granulated	ton		

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50 @	4.00
Rodo #10	lb.	4.50 @	5.00
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors No. 5145	lb.	2.00 @	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.25 @	.47
Santomerse S (dispersing, wetting, penetrating and stabilizing agent)	lb.	.11 @	.25
Sunproof	lb.	.20 @	.25
Sponge Paste	lb.	— @	.18
Tackol (tackifier)	lb.	.085 @	.18
Tonox	lb.	.52 @	.61

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.53 @	2.78
Nitric, 36 degrees	cwt.	5.00 @	6.00
Sulfuric, 66 degrees	ton	15.50 @	16.50
Acids, Fatty			
Laurex	lb.	.10½ @	.13
SL #10	lb.	.12 @	.14
Stearex Beads	lb.	.08 @	.09
Stearic, double pressed	lb.	.12½ @	.13½
Stearite	lb.	.09 @	—
Alkalies			
Caustic Soda, 76%	cwt.	2.70 @	3.55
Soda Ash, 58%, C.L.	cwt.	— @	2.35
Oils			
Cycline Oil	gal.	.14 @	.20
Degras, bbls.	lb.	.07¾ @	.08
Fluxrite	lb.	.05½ @	.06½
Palm Niger	lb.	.05½ @	.06½
Para-Flux	gal.	.17 @	.18
Para Lube	lb.	— @	.05
Petrolatum, light	lb.	.03½ @	.03¾
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
Pine, steam distilled	gal.	.64 @	.69
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rubtack	lb.	.08 @	.10
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.07 @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Wobonite, c.l.	lb.	.05 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.05½ @	.06½
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	6.00 @	6.50
Pigmentar, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	ton	20.00 @	26.00
Solvents			
Acetone, pure	lb.	— @	.06¼
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33 @	.39
Benzene, 90%	gal.	.18 @	.23
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.50
Carbon, bisulfide	lb.	.05¼ @	.08
Carbon tetrachloride	gal.	.73 @	1.065
Dichlorethylene	lb.	— @	.25
Dipentene, cml., drums	ga'.	.41 @	.50
Ethylene dichloride	lb.	.05½ @	.06½
Plastogen	lb.	.07¾ @	.12½
Reogen (drums)	lb.	.11½ @	.20
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Trichlorethylene	lb.	— @	.08½
Turpentine, spirits	gal.	.43 @	.47
dest. dist., drums	gal.	.33 @	.41
Waxes			
Beeswax, white	lb.	.39 @	.45
Carnauba, yellow	lb.	.46 @	.47½
Ceresin, white, dom.	lb.	.08 @	.11
Montan, crude	lb.	.10¾ @	.11¼
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.02¾ @	—
White crude scale 124/126	lb.	.02¾ @	.03
Refined, 122/127	lb.	.04½ @	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.50 @	1.95
Exel	lb.	1.00 @	1.40
Gel	lb.	.57 @	.73
Hipar	lb.	.65 @	.92
Powder	lb.	.52 @	.64
Resin	lb.	.52 @	.64
Resin D	lb.	.52 @	.64
White	lb.	1.25 @	1.60
Albasan	lb.	.70 @	.75
Antox	lb.	.56 @	.58
B-L-E	lb.	.52 @	.61
Flectol B	lb.	.52 @	.65
Flectol H	lb.	.52 @	.65
Flectol White	lb.	.90 @	1.15
Neozone	lb.	.52 @	.63
Oxynone	lb.	.64 @	.80
Retardex	lb.	.35 @	.40
Santoflex B	lb.	.52 @	.65
Santovar A	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.52 @	.61

MOLD LUBRICANTS

Aresklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Lubrex	lb.	.25 @	.30
Mold Paste	lb.	.12 @	.18
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rusco, f.o.b. Nitro	lb.	.12 @	.30
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.17 @	—
Black	lb.	.08 @	.12
White	lb.	.08½ @	.12
Brown	lb.	.08 @	.10½
Neophax	lb.	.09¼ @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½ @	.15
Sulfur Chloride, yellow (drs.)	lb.	.04 @	—
Sulfur flour, Refined, 100% pure (bags)	cwt.	2.50 @	3.65
Commercial (bags)	cwt.	1.60 @	2.35
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1938	397,620	125,357,730	14.07	5,652	1,799,124	14.21	391,968
1938:							
Aug.	30,798	8,477,231	12.29	432	133,350	13.79	30,366
Sept.	34,383	10,650,107	13.83	803	242,324	13.48	33,580
Oct.	33,449	10,945,896	14.61	621	196,523	14.14	32,828
Nov.	31,903	10,572,345	14.79	415	146,276	15.73	31,488
Dec.	36,031	12,601,926	15.61	424	141,364	14.87	35,607
1939							
Jan.	35,255	12,313,006	15.59	468	165,663	15.79	34,787
Feb.	29,109	10,269,224	15.75	460	152,113	14.76	28,649
Mar.	43,490	15,058,279	15.46	439	171,279	17.43	43,051
Apr.	30,836	10,400,125	15.06	440	151,644	15.38	30,396
May	42,998	15,041,433	15.62	496	180,091	16.20	42,502
June	32,437	11,403,150	15.69	413	147,910	16.00	32,024
July	34,288	12,071,105	15.72	440	164,428	16.69	33,848
Aug.	35,794	12,702,958	15.84	267	89,741	15.01	35,527

* Revised.

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1922, however, include both latex and guayule; guayule only is included in 1923. Annual figures for 1922-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule: Tons	Guayule: Dollars	Balata: Tons	Balata: Dollars	Jelutong: Tons	Jelutong: Dollars	Liquid Latex (1): Tons	Liquid Latex (1): Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1938	2,485	623,819	509	181,140	9,132	2,944,504	11,878	4,147,318
1938:								
Aug.	250	53,285	41	13,637	526	159,784	876	308,573
Sept.	173	37,954	39	13,896	740	225.161	683	235,242
Oct.	126	27,692	45	20,641	614	163,635	876	347,348
Nov.	59	12,923	66	24,725	307	76,452	1,020	394,082
Dec.	181	39,869	13	6,263	917	237,653	1,263	479,966
1939:								
Jan.	226	49,580	61	20,417	843	203,753	1,602	599,927
Feb.	212	46,576	15	4,426	510	129,726	1,717	657,565
Mar.	229	39,520	14	5.215	641	136,112	2,005	731,302
Apr.	180	24,584	59	18,170	281	72,024	1,018	360,739
May	102	22,347	56	16,359	645	161,745	2,786	1,067,682
June	91	19,879	119	33,876	597	122,087	1,836	694,863
July	150	32,626	39	18,813	663	141,540	2,934	1,064,927
Aug.	178	38,687	28	8,689	742	208,156	2,614	1,001,013

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

	Figures on Monthly Basis: 1932*	1933*	1934*	1935*	1936*	1937*	1938*	1939
Jan.	29,648	22,645	39,190	46,636	48,631	50,879	31,265	46,234
Feb.	31,821	21,392	40,515	42,720	36,841	51,950	25,357	42,365
Mar.	29,505	17,843	47,003	42,153	42,813	54,129	32,389	50,165
Apr.	27,518	25,928	44,853	44,247	52,031	51,859	29,730	44,166
May	30,957	44,074	42,918	41,101	50,612	51,795	30,753	44,377
June	41,475	50,743	40,147	36,156	52,772	51,860	32,540	47,259
July	29,976	49,614	32,553	35,917	48,250	43,703	34,219	43,880
Aug.	23,721	44,428	33,216	38,775	46,777	41,506	40,552	50,481
Sept.	23,847	35,281	30,258	37,086	46,449	43,945	40,183	
Oct.	22,286	31,543	31,253	41,969	49,637	38,754	42,850	
Nov.	23,231	28,831	34,748	42,310	50,433	34,025	49,050	
Dec.	18,015	28,757	36,569	42,474	49,754	29,195	48,143	
Tot.	332,000	401,079	453,223	491,544	575,000	543,600	437,031	

* Revised.

Note: All figures are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*	Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*
1929	218,954	226,588	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,000	1935	122,948	113,078	23.0	25,069
1931	133,351	124,126	33.9	19,257	1936	150,571	141,486	24.6	19,000
1932	75,608	77,504	23.4	16,354	1937*	185,033	162,000	29.8	28,800
1933	99,560	81,602	19.9	20,746	1938*	122,403	120,800	27.6	23,000
	Figures on Monthly Basis								
1938:*									
Jan.	8,303	7,463	23.9	28,982	July	7,668	8,777	25.6	18,956
Feb.	6,685	7,679	30.3	27,518	Aug.	11,295	11,387	28.1	18,307
Mar.	7,416	9,109	28.1	25,366	Sept.	12,961	11,969	29.8	18,540
Apr.	6,902	8,043	27.1	23,799	Oct.	14,624	12,522	29.2	19,910
May	7,406	8,613	28.0	22,042	Nov.	15,095	13,440	27.4	21,001
June	8,180	8,779	27.0	20,785	Dec.	15,868	13,019	27.1	23,000
1939:									
Jan.	13,763	13,000	28.1	21,960	July	12,588	13,542	30.9	21,339
Feb.	13,093	12,626	29.8	21,390	Aug.	17,214	16,846	33.4	20,645
Mar.	14,528	15,322	30.5	19,955	Sept.	.....	.....	...	.....
Apr.	14,527	13,391	30.3	22,628	Oct.	.....	.....	...	.....
May	14,769	13,517	30.5	22,771	Nov.	.....	.....	...	.....
June	15,871	14,870	31.4	23,058	Dec.	.....	.....	...	.....

* Stocks on hand at the end of month or year.

* Revised.

Note: Figures for 1938 were revised on June 1, 1939, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1937*	1938	1939		1937*	1938	1939
January	33,668	35,176	37,847	August	49,598	50,459	53,728
February	32,034	31,861	34,595	September	47,515	46,058	.....
March	40,524	41,259	42,520	October	45,446	46,272	.....
April	43,461	43,254	43,977	November	42,718	44,991	.....
May	45,407	44,911	49,547	December	39,465	41,649	.....
June	48,447	48,293	49,812				
July	51,069	47,474	50,508	Total	519,352	521,657	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,192
1929	24,141,502	1933	8,713,962	1937	22,257,964
1930	17,364,096	1934	12,255,118	1938	10,612,138

1939		1939		1939	
January ...	1,714,137	May	1,243,519	September .	1,585,300
February ..	1,442,535	June	1,019,626	October ...	.....
March	1,730,211	July	681,434	November .	.....
April	1,348,335	August	970,571	December .	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

1937	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
June	....20⅛	20⅛	19⅞	19⅛	——	——	18⅞	19⅛	18⅝	18⅞	18⅛	——	——	18⅞	18⅝	19⅛	19⅛	19⅛	——	——	19⅜	19⅜	19⅜	19⅜	19⅛	——	——	19⅛	19⅛	19⅛	——	19⅜
July	....19⅜	19⅛	18⅞	18½	18⅛	19⅛	19⅜	19⅛	19⅛	18⅞	18⅛	19⅛	——	19⅛	19⅛	19⅛	18⅞	18¾	18¾	18⅞	18¾	18¾	18¾	18¾	18¾	18¾	——	18⅛	18⅛	18⅛	——	18⅝
Aug.	....	18⅛	18⅞	18¾	——	18⅛	18⅛	18⅛	18⅛	18⅛	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	18⅛
Sept.	....	18⅛	18¾	17⅜	17⅜	17⅜	19⅛	19⅛	19⅛	19⅛	19⅛	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18½	18½	18½	18¾	18¾	18¾	18¾	18¾	17⅝	17⅝	——	18⅛
Oct.	....	17⅜	14⅜	14⅛	14⅛	14⅛	16⅜	16⅜	14⅜	16⅜	16⅛	15⅝	16⅛	16⅛	16⅛	16⅛	16⅛	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	14⅜	15⅜	15⅜	15⅜	——	16⅛
Nov.	....	15⅛	15½	15½	——	15⅛	15⅛	15⅛	15⅛	15½	15⅜	——	15	15	15	15	15⅛	15⅛	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	——	14⅛	15	14⅜	14½	14½	14⅜	14⅝
Dec.	....	15	15⅛	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	15⅜
1938																																
Jan.	....	——	14⅞	14⅞	14⅜	14⅜	14⅜	14⅜	——	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	——	——	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	15⅛	14⅛	14⅛	14⅜	——	——	14⅜	14⅜
Feb.	....	14⅛	14⅛	14⅛	14⅜	——	——	14⅜	14⅜	14⅜	14⅜	14⅛	——	14⅜	14⅜	14⅜	14	14	14⅛	14⅜	——	14⅞	14⅞	15	14⅛	14⅛	——	——	——	——	——	14⅞
Mar.	....	14⅛	14⅛	14⅜	14⅜	——	——	14⅜	14⅜	14⅜	14⅜	14	——	14⅛	14⅛	13⅞	14	14	13⅞	13⅞	——	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞
April	....	10⅞	11⅛	11⅛	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅛	11⅛	12⅛	12⅛	12⅛	11⅞	11⅞	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛
May	....	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
June	....	11⅜	11⅜	11⅜	——	——	11⅜	11⅜	11⅜	11⅜	11⅜	12	12	12	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛
July	....	15⅛	15⅛	15⅛	14⅜	14⅜	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
August	....	15⅛	15⅛	15⅛	15⅛	16	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Sept.	....	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Oct.	....	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Nov.	....	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Dec.	....	15⅛	15⅛	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
1939																																
Jan.	....	——	——	16⅛	16⅛	16	16	——	15⅜	16	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜
Feb.	....	15⅜	15⅜	15⅜	——	——	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜
March	....	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
April	....	15⅜	15⅜	16	15⅛	16	16⅛	16⅛	16⅛	16⅛	16⅛	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜
May	....	15⅜	15⅜	16	15⅛	16	16⅛	16⅛	16⅛	16⅛	16⅛	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜
June	....	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
July	....	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
August	....	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
September	.19⅞	16⅞	16⅜	16⅜	16⅛	24	21½	20	22	19	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
October	....	20	——	19½	19⅜	19½	19	——	——	——	19⅛	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Markets)

Average Price per Pound for Years 1911-1931

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.55
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	11.98
1915	65.85	1919	48.70	1923	29.45	1927	37.72	1931	6.17

Average Monthly Price per Pound Since 1932

	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	4.38	3.08	9.32	13.10	14.35	21.37	14.63	15.75
Feb.	4.03	2.95	10.45	12.92	15.48	21.33	14.71	15.93
Mar.	3.35	3.01	11.01	11.51	15.89	24.09	13.55	16.26
Apr.	3.02	3.56	12.10	11.55	15.98	23.44	11.84	15.87
May	3.09	4.95	13.26	12.05	15.62	21.14	11.57	16.07
June	2.66	6.15	13.51	12.57	15.85	19.29	12.57	16.37
July	2.89	8.01	14.60	12.10	16.49	18.86	15.37	16.51
Aug.	3.63	7.31	15.47	11.98	16.25	18.37	16.08	16.67
Sept.	3.84	7.30	15.36	11.55	16.46	18.55	16.15	21.24
Oct.	3.65	7.64	13.96	12.62	16.55	16.28	16.89	
Nov.	3.44	8.66	13.04	13.15	17.97	14.60	16.24	
Dec.	3.24	8.87	12.98	13.28	20.01	15.41	16.05	
Average for Year	3.49	5.96	12.92	12.37	16.41	19.39	14.64	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1939 July	1939 Aug.	1939 Sept.	1939 Oct.	Day	1939 July	1939 Aug.	1939 Sept.	1939 Oct.
1	——	8 1/16	——	——	17	8 1/16	8 1/16	——	
2	——	8 1/8	——	9 1/16	18	8 1/8	8 5/8	9 3/4	
3	8 1/16	8 1/16	——	9 1/2	19	8 1/16	——	9 3/8	
4	8 1/16	8 1/2	——	9 5/8	20	8 1/16	——	9 1/2	
5	8 1/16	——	——	9 5/8	21	8 3/8	8 5/8	9 1/2	
6	8 1/16	——	——	9 1/2	22	——	8 5/8	9 1/2	
7	8 1/16	——	10	——	23	——	8 1/2	——	
8	——	8 1/2	9 1/2	——	24	8 3/8	8 1/2	——	
9	——	8 1/2	——	9 5/8	25	8 5/8	8 1/2	9 3/8	
10	8 5/8	8 1/2	——	9 5/8	26	8 5/8	——	9 3/8	
11	8 5/8	8 1/2	10		27	8 5/8	——	9 3/8	
12	8 5/8	——	10		28	8 3/8	8 3/8	9 3/8	
13	8 5/8	——	10		29	——	8 3/4	9 3/8	
14	8 5/8	8 5/8	9 3/4		30	——	8 1/2	——	
15	——	8 5/8	9 3/4		31	8 7/16	8 1/2	——	
16	——	8 1/2	——						

Average Monthly Price Per Pound

Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence	Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence
Jan.	6.758	10.378	7.077	7.926	Aug.	7.581	8.830	7.841	8.545
Feb.	7.255	10.503	7.029	7.942	Sept.	7.577	8.935	7.918	9.634
Mar.	7.450	11.766	6.590	8.120	Oct.	7.898	7.855	8.355	
Apr.	7.502	11.471	5.793	7.910	Nov.	8.572	7.080	8.111	
May	7.335	10.250	5.632	8.002	Dec.	9.580	7.332	8.005	
June	7.352	9.548	6.147	8.216	Average for Year	7.713	9.424	7.164	
July	7.696	9.136	7.464	8.271					

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1939 Aug.	1939 Sept.	1939 Oct.	Date	1939 Aug.	1939 Sept.	1939 Oct.	Date	1939 Aug.	1939 Sept.	1939 Oct.
1	9.81	8.92	——	11	9.39	9.64		22	9.27	9.13	
2	9.69	8.87	9.33	12	9.33	9.58		23	9.10	9.08	
3	9.64	——	9.22	13	——	9.45		24	9.17	——	
4	9.55	——	9.20	14	9.29	9.55		25	9.11	9.08	
5	9.55	9.25	9.17	15	9.29	9.48		26	9.04	9.11	
6	——	9.49	9.19	16	9.24	9.20		27	——	9.18	
7	9.60	10.00	9.16	17	9.27	——		28	8.82	9.27	
8	9.47	9.82	——	18	9.32	9.07		29	8.91	9.29	
9	9.53	9.35	9.09	19	9.22	9.05		30	8.82	9.39	
10	9.47	——	9.14	20	——	9.17		31	8.91	——	
				21	9.19	9.12					

Average Monthly Price Per Pound

	1936 Cents	1937 Cents	1938 Cents	1939 Cents		1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	11.91	13.06	8.57	8.94	Aug.	12.28	10.41	8.41	9.30
Feb.	11.53	13.15	8.91	8.97	Sept.	12.31	9.02	8.17	9.30
Mar.	11.43	14.46	8.92	9.00	Oct.	12.30	8.42	8.61	
Apr.	11.71	14.23	8.76	8.87	Nov.	12.23	7.96	9.08	
May	11.68	13.34	8.50	9.56	Dec.	12.83	8.26	8.72	
June	12.02	12.70	8.38	9.88	Average for Year	12.11	11.44	8.66	
July	13.11	12.26	8.85	9.71					

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of:	ON HAND 1937	ON HAND 1938*	ON HAND 1939	AFLOAT 1937	AFLOAT 1938	AFLOAT 1939	ON HAND AND AFLOAT 1937	ON HAND AND AFLOAT 1938*	ON HAND AND AFLOAT 1939
Jan.	204,436	276,497	237,826	55,096	57,356	48,210	259,532	333,853	286,036
Feb.	195,692	292,067	231,475	53,538	47,459	55,814	249,230	339,526	287,289
Mar.	192,980	301,762	205,936	56,994	41,882	55,981	249,974	343,644	261,917
Apr.	176,289	303,901	190,896	72,530	39,071	57,918	248,819	342,972	248,814
May	175,273	300,907	193,602	58,542	32,859	54,046	233,815	333,766	247,648
June	172,056	294,796	181,794	57,215	32,079	51,274	229,271	326,875	233,068
July	167,094	282,785	174,240	75,779	40,400	52,990	242,873	323,185	227,230
Aug.	174,195	273,841	161,358	80,439	47,772	66,717	254,634	321,613	228,075
Sept.	186,193	268,094		83,288	48,927		269,481	317,021	
Oct.	200,025	259,074		80,653	50,162		280,678	310,136	
Nov.	222,707	242,592		81,302	51,114		304,009	293,706	
Dec.	262,204	231,500		63,099	45,105		325,303	276,605	

* Revised.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1937	London 1938	London 1939	Liverpool 1937	Liverpool 1938	Liverpool 1939
January	29,005	40,203	51,420	41,895	21,711	28,789
February	26,508	46,596	48,312	37,078	24,737	26,784
March	21,292	50,233	46,768	30,622	26,220	24,996
April	21,128	54,296	44,760	27,443	28,277	23,742
May	21,351	57,194	43,454	25,081	29,862	22,211
June	21,964	60,307	42,374	21,258	31,837	21,176
July	22,589	62,236	37,772	19,424	32,825	19,116
August	25,211	65,113		19,817	34,315	
September	28,462	63,321		21,190	34,645	
October	30,465	59,609		21,327	33,483	
November	33,304	57,794		21,399	32,116	
December	35,633	55,668		21,978	31,012	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [3]	Holland	Para and Manaos
At end of 1938					
August	41,002	49,922	4,659	672	1,032
September	35,386	53,815	5,339	662	1,599
October	34,901	54,720	4,916	669	1,796*
November	31,255	54,283	4,409	349	2,267
December	27,084	57,860	6,120	268	1,864
At end of 1939					
January	30,975	59,155	4,827	198	1,557
February	28,559	59,399	4,318	183	1,826
March	23,255	58,005	3,389	137	2,244*
April	22,434	55,238	3,648	131	2,209
May	20,849	52,837*	4,005	136	1,966
June	19,563*	55,834	3,771	101	1,821
July	27,042	55,948	4,217	...	1,474

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

End of:	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
1938				
June	32,079	42,580	17,341	92,000
July	40,400	39,150	25,450	105,000
August	47,772	34,500	18,728	101,000
September	48,927	29,200	17,873	96,000
October	51,062	26,100	21,838	99,000
November	51,114	26,700	14,186	92,000
December	45,105	26,800	8,095	80,000
1939				
January	48,210	27,900	28,890	105,000
February	55,814	28,300	21,886	106,000
March	55,981	25,200	20,819	102,000
April	57,918	27,200	13,882	99,000
May	54,046	25,700	16,254	96,000
June	51,274	25,260	11,466	88,000
July	52,990	28,060	24,010	105,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate.

TOTAL PRINCIPAL WORLD STOCKS

(Figures from the Survey of Current Business)

At End of:	1934	1935	1936	1937*	1938*	1939
January	661,948	698,153	600,479	454,249	549,762	497,665
February	663,308	686,195	599,355	445,265	565,833	479,578
March	666,382	678,809	583,318	447,856	586,666	460,723
April	658,796	677,006	567,172	428,249	586,291	438,252
May	689,239	677,569	541,871	413,134	568,158	429,979
June	672,804	671,525	520,255	434,250	573,136	407,640
July	676,200	679,061	519,074	445,782	580,654	418,639
August	674,702	680,644	500,520	457,462	565,394	.....
September	694,361	661,509	493,585	470,768	551,447	.....
October	680,616	655,000	486,159	479,398	540,976	.....
November	684,408	617,300	466,491	493,266	512,196	.....
December	705,975	613,987	466,576	545,533	482,852	.....
Monthly Avge.	677,395	666,397	528,738	460,022	555,280	.....

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Production Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	11,004	6,635	13,437	13,355	11,376	15,565	7,532	13,702*
Apr.-June	12,980	14,412	13,565	12,597	14,892	15,834	8,353	13,490*
July-Sept.	9,245	14,707	9,822	11,312	14,914	12,207	11,240	
Oct.-Dec.	6,856	9,550	10,406	12,099	14,858	9,704	13,052	
Total	40,085	45,304	47,230	49,363	56,040	53,310	40,182	

Shipment Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	8,760	6,981	10,730	11,154	10,554	14,143	7,534	12,156*
Apr.-June	18,021	15,139	14,998	13,473	15,940	15,741	10,363	14,908*
July-Sept.	8,141	13,707	11,648	13,489	14,037	13,106	11,748	
Oct.-Dec.	5,329	8,265	9,310	12,066	12,855	10,495	12,685	
Total	40,251	44,092	46,686	50,182	53,386	53,485	42,330	

Inventory Figures [2]

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	9,878	7,290	11,651	11,675	8,762	12,004	10,521	10,248*
Apr.-June	4,999	6,615	10,219	10,755	7,556	12,081	8,470	8,909*
July-Sept.	6,096	7,595	8,419	8,288	8,690	11,200	8,022	
Oct.-Dec.	7,644	8,888	9,455	8,196	10,717	10,383	8,451	

Figures for Recent Months

	PRODUCTION 1937	PRODUCTION 1938	PRODUCTION 1939	SHIPMENTS 1937	SHIPMENTS 1938	SHIPMENTS 1939	INVENTORY [2] 1937	INVENTORY [2] 1938	INVENTORY [2] 1939
July	4,138	3,287	4,510	5,005	3,870	5,056	11,238	8,041	8,300
Aug.	3,841	4,038	5,492	4,711	3,991	4,919	10,427	8,217	8,891
Sept.	4,227	3,916		3,390	3,888		11,200	8,022	

AUTOMOBILE INNER TUBES

Production Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	10,721	6,230	12,823	12,553	11,891	15,831	7,314	12,385*
Apr.-June	11,913	13,001	13,191	11,631	14,624	15,413	7,380	12,067*
July-Sept.	8,286	14,356	10,321	11,270	15,320	12,038	10,794	
Oct.-Dec.	5,970	9,000	9,891	12,425	15,201	9,092	12,360	
Total	36,890	42,587	46,226	47,879	57,036	52,374	37,848	

Shipment Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	8,918	6,539	10,640	11,252	11,367	14,606	7,387	11,371*
Apr.-June	16,271	13,292	14,553	11,928	15,113	15,495	9,564	13,233*
July-Sept.	7,761	13,370	11,545	13,251	15,069	12,901	11,243	
Oct.-Dec.	4,961	8,189	8,305	11,636	12,874	9,765	12,099	
Total	37,911	41,390	45,044	48,067	54,423	52,767	40,239	

Inventory Figures [2]

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	9,448	6,369	10,244	10,406	8,660	11,993	10,547	9,163*
Apr.-June	5,174	6,097	8,795	10,050	8,075	11,833	8,337	8,044*
July-Sept.	5,753	7,008	7,639	7,565	8,595	11,326	7,859	
Oct.-Dec.	6,749	7,815	9,180	8,231	10,945	10,312	8,166	

Figures for Recent Months

	PRODUCTION 1937	PRODUCTION 1938	PRODUCTION 1939	SHIPMENTS 1937	SHIPMENTS 1938	SHIPMENTS 1939	INVENTORY [2] 1937	INVENTORY [2] 1938	INVENTORY [2] 1939
July	4,049	2,936	4,043	5,084	3,519	4,285	10,950	7,723	7,819
Aug.	3,914	4,026	4,918	4,721	3,744	4,432	10,220	8,029	8,238
Sept.	4,074	3,832		3,096	3,980		11,326	7,859	

[1] Based on reports received from the Rubber Manufacturers Association.
[2] Held by manufacturers at end of period indicated.
* Revised.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,124
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937*	4,808,974	3,915,889	893,085	207,463	153,046	54,417	5,016,437
1938	2,489,635	2,000,985	488,650	166,142	125,081	41,061	2,655,777
1939							
Jan.*	342,156	281,465	60,691	14,794	11,404	3,390	356,950
Feb.*	303,217	243,000	60,217	14,300	10,914	3,386	317,517
Mar.	371,940	299,703	72,237	17,549	12,689	4,860	389,489
Apr.	337,372	273,409	63,963	16,891	12,791	4,100	354,263
May	297,508	237,870	59,638	15,706	11,585	4,121	313,214
June	309,720	246,704	63,016	14,515	10,585	3,930	324,235
July	209,343	150,738	58,605	9,135	5,112	4,023	218,478
Aug.	99,868	61,384	38,484	3,475	1,068	2,407	103,343
Sept.	.....	.....	.....	.....	.....	.....	.....

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]								NETHERLAND INDIES [4]						
	Gross Exports	Imports	Net Exports	Ceylon [2]	India & Burma [3]	Sarawak [3]	British North Borneo [3]	Siam [3]	Java & Madura	Sumatra E. Coast	Other N. I.	Indo-China [3]	Amazon Valley	All Other [3]	World Total [6]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,336	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,294	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,345	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	5,551	84,085	139,632	207,863	43,399	15,576	13,063	1,133,864
1938	526,911	156,101	370,810	49,528	15,178	17,792	9,512	41,080	57,526	94,501	145,909	58,518	14,618	12,920	887,892
1938:															
Apr.	53,864	9,158	44,706	1,951	1,327	1,728	1,158	1,583	5,967	10,081	12,434	3,647	1,004	774	86,360
May	38,245	10,325	27,920	2,833	1,470	1,648	815	2,507	4,575	7,515	9,944	3,118	1,053	904	64,302
June	42,258	14,394	27,864	3,693	1,318	2,441	643	3,904	4,519	7,788	12,120	4,776	718	818	70,602
July	43,689	18,713	24,976	3,861	1,083	2,057	937	4,710	6,808	8,271	19,955	5,139	625	1,063	79,485
Aug.	47,246	13,735	33,511	4,401	953	965	728	4,793	4,757	7,339	11,006	3,840	1,050	1,074	74,417
Sept.	40,992	10,586	30,406	3,990	1,036	756	284	3,893	4,026	7,052	9,092	8,139	758	1,292	70,724
Oct.	42,294	16,599	25,695	4,893	1,111	1,612	1,075	4,438	4,486	8,229	17,166	3,638	1,796	1,092	75,231
Nov.	39,340	10,219	29,121	6,422	1,271	929	567	3,223	3,975	5,678	9,568	4,035	1,169	990	66,938
Dec.	32,901	7,607	25,294	3,212	1,586	599	227	3,029	1,873	4,332	4,315	9,815	2,205	1,021	57,508
1939:															
Jan.	43,332	19,049	24,283	7,237	1,879	2,342	1,604	2,918	6,787	11,261	20,630	4,739	1,708	1,200*	86,588
Feb.	43,084	13,889	29,195	5,495	1,565	1,484	664	5,606	4,833	8,410	11,658	5,659	1,056	1,200*	76,825
Mar.	43,259	14,035	29,224	3,718	1,393	1,177	344	5,401	5,361	8,084	14,428	4,636	1,331	1,200*	76,297
Apr.	43,668	13,996	29,672	2,225	1,260	2,446	1,687	2,660	5,321	9,250	13,691	2,581	1,139	1,200*	73,132
May	42,214	12,697	29,517	2,807	1,678	1,649	558	2,782	4,105	8,159	12,009	4,585	874	1,200*	69,923
June	31,541	9,567	21,974	3,708	1,452	1,157	332	1,748	5,839	8,846	12,754	4,630	591	1,200*	64,231
July	45,962	20,052	25,910	5,018	1,291	3,092	1,603	5,599	5,229	11,020	19,325	3,367	600*	1,200*	83,254
Aug.	53,497	12,635	40,862	5,686	401	1,749	975	4,600	3,996	8,421	14,766	7,133	600*	1,200*	90,389

All figures from January, 1934, onward are net exports shown on a "dry rubber" basis as calculated by the International Rubber Regulation Committee. (1) Prior to January, 1934, Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex also is not included in the early years, which on a dry rubber basis was as follows: 1924—1,117 tons; 1925—3,618; 1926—3,263; 1927—2,439; 1928—2,247; 1929—3,574; 1930—2,750; 1931—1,940; 1932—5,193; 1933—10,470, and 1934—14,172 tons. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments on a dry rubber basis were: 1923—18 tons; 1924—90; 1925—6; 1926—20; 1927—½; 1928—1; 1929—2; 1930—11; 1931—2; 1932—2; 1933—1, and 1934—6 tons. (3) Official statistics. (4) Exports from "Other N. I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included in earlier years, which is as follows on a dry rubber basis: 1923—2,342 tons; 1924—1,008; 1925—2,239; 1926—44; 1927—84; 1928—1,395; 1929—437; 1930—2,744; 1931—3,874; 1932—3,488; 1933—5,260, and 1934—5,330 tons. (5) Calculated from official import statistics of principal consuming countries; also includes United States imports of guayule. (6) This total includes the third column for British Malaya and all other figures shown for other territories. (*) Figure is provisional.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,773	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	30,462	19,164	14,970	4,343	4,680	2,400	13,063	1,055,356
1938	406,343	133,079	59,660	90,200	25,696	45,836	28,170	25,650	11,944	11,309	5,092	16,034	2,400	9,936	871,349
1938:															
Apr.	31,870	14,653	5,757	6,497	999	5,454	2,397	4,281	640	904	449	971	200*	920	75,992
May	27,809	14,675	5,169	9,595	2,545	3,327	2,422	4,163	1,041	1,137	419	1,283	200*	957	74,742
June	26,429	14,053	4,542	7,478	3,243	2,145	2,399	505	805	853	663	1,149	200*	988	65,452
July	22,209	12,678	5,433	6,927	2,685	3,099	3,641	541	1,215	1,106	528	1,151	200*	635	62,048
Aug.	31,494	12,891	3,662	7,190	1,832	2,033	2,078	739	1,182	1,238	259	965	200*	595	66,358
Sept.	34,436	8,100	5,094	7,390	1,405	3,584	1,799	1,725	1,779	519	385	1,830	200*	608	68,854
Oct.	33,830	3,085	3,791	6,326	3,139	3,204	3,921	2,000*	1,780	848	420	3,022	200*	9	65,575
Nov.	32,567	936	5,322	7,275	3,123	4,665	1,984	4,000*	660	636	530	1,209	200*	379	63,486
Dec.	37,051	4,134	5,820	7,481	2,198	4,000	2,355	2,500*	647	876	263	1,013	200*	648	69,186
1939:															
Jan.	36,614	836	4,684	7,227	2,867	2,553	2,133	4,000*	910	898	454	1,037	200*	1,131	65,544
Feb.	30,578	4,773	5,315	7,569	1,451	3,263	2,025	2,000*	1,741	1,068	184	858	200*	524	61,549
Mar.	45,286	8,082	4,503	8,036	2,458	4,019	1,525	2,000*	1,316	1,242	368	1,133	200*	463	80,631
Apr.	31,590	4,752	5,639	8,719	1,466	3,579	1,926	2,000*	1,108	855	333	1,062	200*	597	63,826
May	45,390	7,531	4,646	8,413	3,006	4,438	1,573	2,000*	1,188	792	518	1,654	200*	618	81,967
June	33,951	8,439	4,649	8,190	2,423	3,067	1,992	2,000*	1,308	621	672	2,703	200*	487	70,702
July	36,932	4,040	4,282	8,437	3,164	3,000*	1,350	1,000*	1,422	859	565	824	200*	412	66,487
Aug.	38,319	2,044													

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation. *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE: THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.